- BREAKING THE ICE -

Seal and Seal Harvesting Patterns and Benefits in Relation to Navigational Ice Breaking in Lake Melville, Labrador

by

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PREFACE

Global energy requirements and Canada's goal of energy self-sufficiency have intensified the search for resources in the northern frontier, which in turn has spawned new technology to operate in frozen seas.

Icebreaking ships are probing northern waters, including Lake Melville in Labrador, which has been described as an industrial transportation corridor of high potential. At present much is experimental and new scientific information is required. The impact of icebreaking ships on the living resources in the sea represents one such aspect of scientific enquiry. In Lake Melville there is a population of ringed seals which has never been systematically studied. Experimental icebreaking in Lake Melville has given impetus to scientific research designed to describe the nature of the Lake Melville ringed seal population, its importance to the hunters of the area, and the potential impact icebreaking may have on the seals and on the traditional harvest of seals.

The Labrador Institute of Northern Studies of Memorial University of Newfoundland has been pleased to enter into a jointly funded contract with the Department of Development of the Government of Newfoundland and Labrador and the Department of Regional Economic Expansion to undertake a preliminary study of ringed seals in Lake Melville as they relate to human harvests and icebreaking activity. In doing so, the Institute meets its commitment to be responsive to local issues, to contribute to the knowledge of Labrador and to enhance the well-being of the people of Labrador. We hope that this initial study will be of use in other marine environments in the North and that it will lead to further enquiry to answer the many questions that this study is bound to raise.

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AOP 1S0

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Most of the households of Rigolet and many households in North West River, along with numerous individual hunters participated by keeping records of their weekly harvest and allowing themselves to be interviewed on their harvesting tactics and results. Without their co-operation much less could be said about the habits of the ringed seals in Lake Melville, the economic and nutritional importance of seal hunting and some of the past impacts of icebreaking in Lake Melville. We must particularly thank Charlotte Michelin of Rigolet for her enthusiasm and persistence in these household surveys. Kathleen Boles is also to be specially thanked for her work as an observer during most of the aerial surveys.

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Lawrence Jackson

Mary Alton Mackey

June, 1983

ERRATA

Page 3, Paragraph 4, Line 2: P. groenlandica should read Pagophilus groenlandica

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SUMMARY

A study was undertaken by the Labrador Institute of Northern Studies of Memorial University to determine the extent and duration of winter resource use (sealing) activities in Lake Melville in the period January - June 1982. The study was to provide baseline date for use in assessing navigational icebreaking impacts on the ringed seal (**Phoca hispida**) population and the related harvesting activities of some Lake Melville residents.

The population of ringed seals in the lake in May, 1982 was estimated at 2935 ± 1662. The seals were generally dispersed over most of the lake, however, greater densities were observed in the central and far eastern portions of the lake. The mean observed density of seals during the spring haul-out in 1982 was generally lower than those found on the Labrador coast and in the eastern arctic in other years. Field study during icebreaking operations in January and March of 1982 provided no evidence of ringed seals, or impacts on seals, of navigational icebreaking. Later studies suggest that birth lairs were already in place at the time of the March 24 icebreaking event. No real differences in distribution of birth or haul-out lairs could be assigned to the icebreaking events except that two haul-out lairs had been built in the ship's March track.

Aerial survey data provided a strong subjective indication, but not statistically significant proof, that the ship's track of 1982 influenced ringed seal distribution during the spring haul-out period. Anecdotal reports of unusual seal whelping events and the finding of whitecoat ringed seal pups along the 1981 ship's track raises serious questions about the possible impacts of navigational icebreaking on seals in Lake Melville.

A total of 37 snowmobiles were counted on the lake ice on opening day (April 25) of the 1982 Lake Melville ringed seal hunt. Travel conditions became so bad during the spring of 1982 that many hunters declined to hunt seals and the count of 37 snowmobiles must therefore be taken as a minimum figure.

Four communities harvest the Lake Melville ringed seals. Rigolet harvests larger numbers and a greater variety of ages and species of seal, with more diversity of methods during a more extended period of the year. Hunters

from the western Lake Melville communities (North West River, Happy Valley-Goose Bay, and Mud Lake) hunt chiefly in the spring and concentrate on young ringed seals killed on the ice, though there is some shooting of ringed seals in open water and some netting of harp seals in June.

Ringed seals make up the bulk of the seal harvest in Lake Melville, ranging between 650 and 900 in recent years. The other important species is the harp seal, the annual harvest of which has been about 200 in recent years.

Men from Rigolet tend to hunt the eastern and southeastern portions of the lake while hunters from North West River, Happy Valley and Mud Lake tend to hunt the central and western portions.

Some hunters, particularly in Rigolet, have a variety of concerns about the effects of icebreaker traffic on the Lake Melville seal population and travel safety and practability. It will be difficult to reconcile the interests of those who must travel on the ice surface with those who must break it. People in western Lake Melville appear to be much less troubled by these questions than residents of Rigolet.

Ringed seal meat is highly nutritious. It makes an important contribution to the diet of households in Rigolet and western Lake Melville. From hunter harvest estimates the projected replacement value for ringed seal meat was $91,000 in 1980 and $94,500 in 1981 for the communities of Rigolet and North West River. The sale of ringed seal pelts brought returns to the Lake Melville area of $18,301 in 1979; $19,200 in 1980 and $14,099 in 1981. The value of raw ringed seal pelts added to the value of edible meat obtained makes seal harvesting an important sector of the traditional economy of many households in the region.

INTRODUCTION

This study of the renewable resource harvesting patterns of Lake Melville came about as a reaction to concerns and public statements, made primarily by Rigolet residents, to recurrent experimental icebreaking probes, by ships, which might lead to regular navigational icebreaking for the entire length of Lake Melville. The council of Rigolet, along with some individuals from other parts of the Lake Melville region, expressed concern that the icebreaking would detrimentally affect their resource harvesting activities and the ringed seal population, as well as create a hazard to travel over the ice surface.

The Department of Development of the Government of Newfoundland began, in late 1981, to initiate a study of the seal harvesting patterns and the ringed seals found in the lake to evaluate the concerns which had been expressed. The Labrador Institute or Northern Studies of Memorial University was approached in December, 1981 by the Department of Development with a request that the Institute undertake a study to provide some baseline data to evaluate these concerns. Icebreaking probes were planned for January and March 1982 (Figure 1) and the Institute's researchers could relate their work closely to these events.

A contract was concluded in March, 1982 whereby the provincial government and the Department of Regional Economic Expansion bore most expenses related to the project excepting the salaries of Institute staff. These salary expenses were borne by the Labrador Institute.

Lake Melville has undergone icebreaking navigation a number of times since the mid-60s. Most voyages were linked to experimental or exploratory objectives; however, a few were rescue missions or aids to attempts at commercial navigation. The following is a list of the past icebreaking events in the lake: February and May 1965, January and May 1967, January 1969, January 1972, December 1972, May 1973, January and March 1980, February and March 1981, and January and March 1982 (this study). A total of 14 voyages in 17 years. Some entered to only the eastern end of the lake while others proceeded almost as far west as Goose Bay.

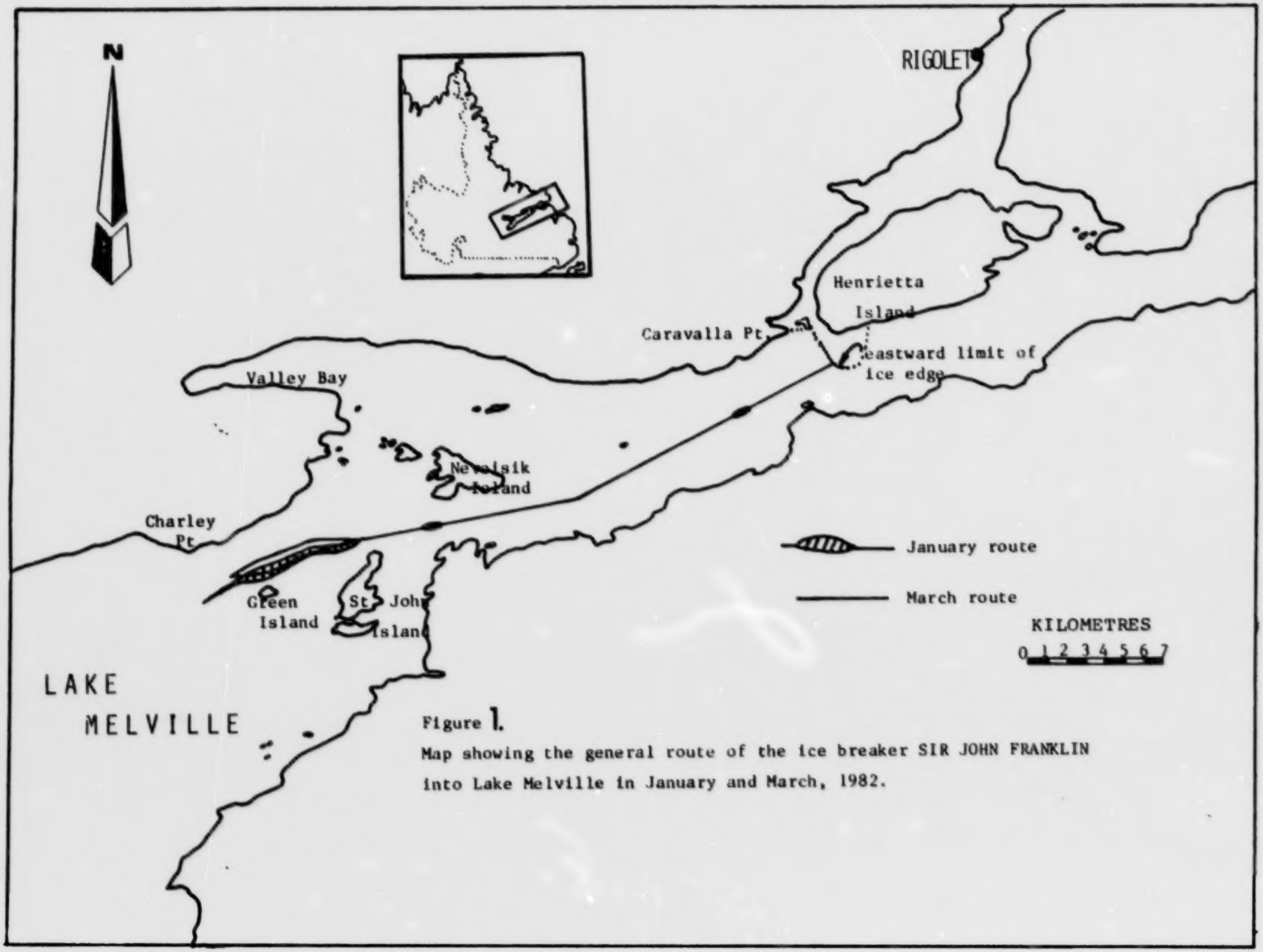

N
RIGOLET
Henrietta Island
Caravalla Pt.
eastward limit of ice edge
Valley Bay
Nevaisik Island
Charley Pt
Green Island
St John Island
LAKE MELVILLE
January route
March route
KILOMETRES
0 1 2 3 4 5 6 7

Figure 1.
Map showing the general route of the ice breaker SIR JOHN FRANKLIN into Lake Melville in January and March, 1982.

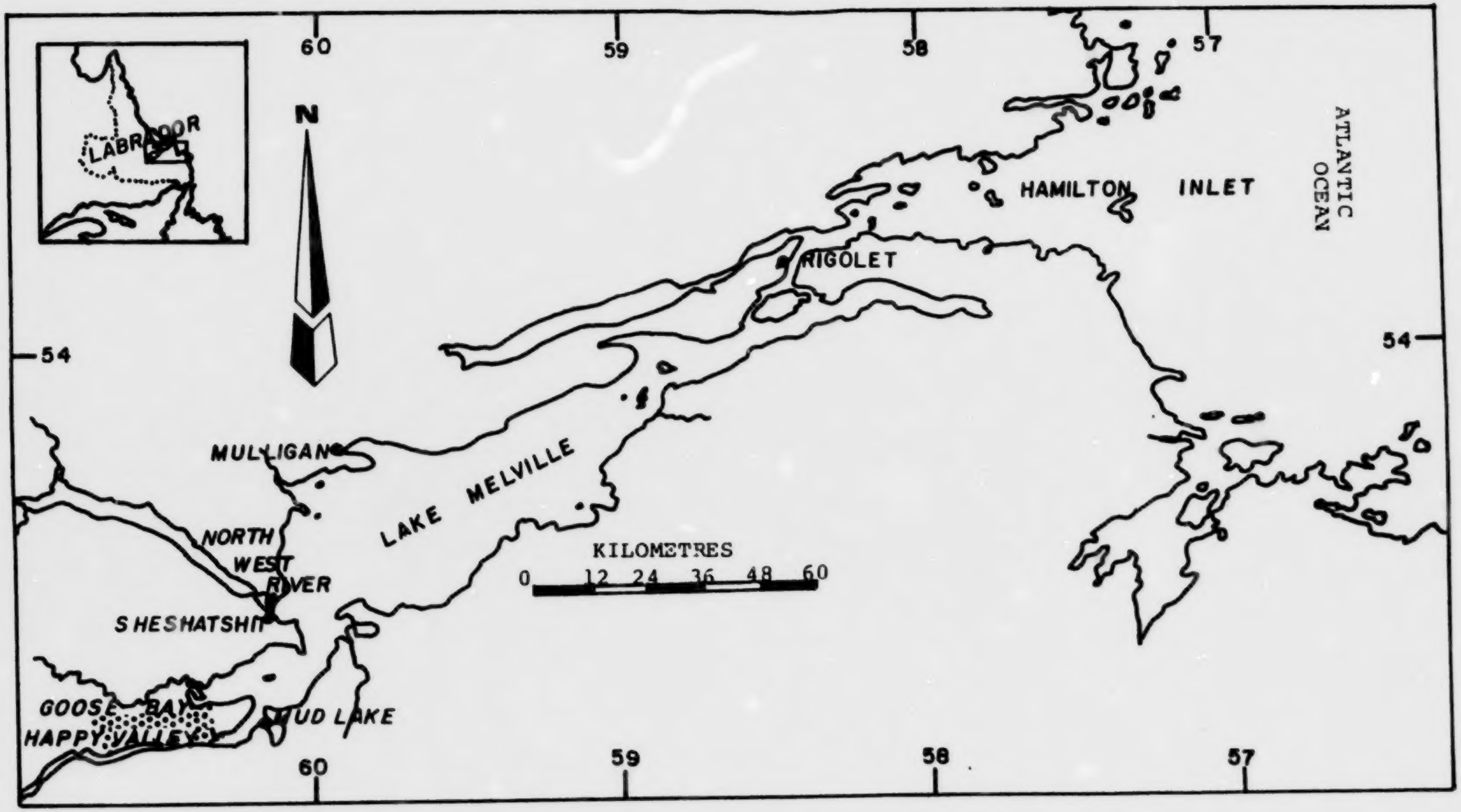
THE STUDY AREA

Lake Melville (Figure 2) is a large landlocked fjord (Bobbit and Akenhead, 1982) with an outer sill depth of 30 m (98 ft.) for about 10 km (6.2 miles) at the entrance. The lake is about 180 km (112 miles) long, 35 km (22 miles) wide at the western end, and covers approximately 2000 sq. km (775 sq. miles). The lake basin is over 200 m (656 ft.) deep, with few shoal areas exclusive of the shorelines. As is typical of fjords, there are two or three distinct layers of water, derived from either the sea water or the fresh river water flowing into the fjord.

The lake surface is covered with landfast ice usually for the period of late December through until late May or early June. For centuries this ice surface has been used by the inhabitants as a travel route to, or the source of, resources required for subsistence in winter months.

With the arrival of the first white settlers in the early 1700s through until the present the ice surface has received increasing use, by weight of sheer numbers and progressing technology, than it did in earlier centuries. Within the last few decades its importance for resource harvesting has declined for some people primarily as a result of the opportunities for wage employment at North West River and Goose Bay. However there is still a considerable use of the ice surface for travel between communities and traplines, recreational ice fishing, and, as described in this study, ringed seal harvesting. There may also be some slight potential for a winter rock cod fishery.

The marine mammal species usually in the lake in various seasons are ringed (**Phoca hispida**), harbour (**P. vitulina**), harp (**P. groenlandica**) and grey (**Halichoerus grypus**) seals. Rarely do hooded (**Cystophora cristata**) or bearded (**Erignathus barbatus**) seals venture into the lake from the open sea. Fish species include, rock cod (**Gadus ogac**), Atlantic salmon (**Salmo salar**), char (**Salvelinus alpinus**), speckled trout (**S. fontinalis**) and smelts (**Osmerus mordax**). Caribou (**Rangifer tarandus**), once abundant but now severely reduced in numbers, are generally restricted to the high ground to the south of the lake, but periodically travel out onto the ice as they commonly did in the past. Moose (**Alces alces**) migrated into the region in the 1950s and can now be found in scattered pockets in the river valleys leading to the lake. Other wildlife



LABRADOR
N
60
59
58
57
54
ATLANTIC OCEAN
HAMILTON INLET
RIGOLET
LAKE MELVILLE
MULLIGAN
NORTH WEST RIVER
SHESHATSHIT
GOOSE BAY
HAPPY VALLEY
MUD LAKE
KILOMETRES
0 12 24 36 48 60

Figure 2. Location map of Lake Melville and the communities of the region.

commonly observed on or around the lake include waterfowl, seabirds and ptarmigan (**Lagopus sp.**), along with boreal mammals such as colored foxes (**Vulpes vulpes**).

Human habitation of the lake area extends back over a period of 5,000 years (Fitzhugh, 1972). First settlement was by Maritime Archaic Indians associated with the coastal regions, followed by interior Indians, and then later by Dorset Eskimos and Inuit. White settlers began arriving early in the 1700s; however, there was a massive influx during the 1940s culminating in the building of the Goose Bay military complex and the town of Happy Valley, which today is the centre of government, education and transportation for the region. The population in the Lake Melville area is approximately 8,500 people distributed as follows: Goose Bay-Happy Valley (7,000), North West River-Sheshatshit (1075), Rigolet (275), Mud Lake (90), Mulligan (6) and North West Islands (2). Up until 1976 Goose Bay had several thousand military personnel along with their dependents but most of these departed when the base was downgraded.

Research on the ecology of Lake Melville has been quite limited. Kindle (1924), while describing the geology, also provides some description of the flora, fauna and human settlement of the region. Tanner (1944) describes the natural history and the way of life of some of the residents. Coachman (1953) of the Blue Dolphin Labrador Expedition was the first to systematically describe the lake's hydrography. The lake's biology has never been systematically described other than in a superficial way. Archaeological research in Lake Melville was fairly sporadic and of a general nature until Fitzhugh (1972) and others carried out intensive work over a two year period.

Studies of possible effects of icebreaking on environmental quality are relatively recent features of planning for northern industrial developments. Both the Arctic Pilot Project (APP 1982) and the Beaufort Sea Development (Alliston 1980, ESL Environmental Sciences 1982) are addressing this issue. In fact, icebreaking exercises by the M.V. Arctic in March 1981 in Lake Melville were used in part, by the Arctic Pilot Project, as a field demonstration for four representatives from the eastern arctic of ships' tracks and snowmobile crossings (APP 1982). Further south, the U.S. Army Corps of Engineers, the Great Lakes Basin Commission and other concerned authorities have been studying proposals for icebreaking to extend the navigation season in the Great Lakes from 8 1/2 months to year round.

A preliminary impact assessment was undertaken of selected biological and socio-economic aspects of Lake Melville in the light of proposed icebreaking probes in December 1979 and March 1980 (ABS Ltd. 1979). Some of the recommendations of the ABS study were, in part, put forward as terms of reference for the current study by the Labrador Institute. In addition, an attempt was made in the spring of 1981 to determine the effects of icebreaking during late winter upon the distribution of wintering seals in Lake Melville (Alliston, 1981). This incomplete study established that ringed seals did occupy and maintain breathing holes in the broken ice resulting from experimental icebreaking and it suggested that breathing hole densities were much higher in the ship's track than in adjacent, unbroken fast ice.

These studies, like the few others on similar topics, can only be described as preliminary to determining in much more detail the environmental impacts of navigational icebreaking in Lake Melville. Some impacts can be assessed fairly accurately prior to the actual event, other impacts may not even be evident during or after the event simply because of their relative obscurity or difficulty to measure. It will take much more work and study of Lake Melville to obtain the raw materials which will enable a further and more adequate impact assessment of navigational icebreaking to be made.

PART 1 RINGED SEALS AND ICEBREAKING IN LAKE MELVILLE

1.0 GENERAL INTRODUCTION TO THE SEAL STUDIES

Research into the ringed seals and related harvesting patterns in Lake Melville was begun in February 1982 under terms of reference provided by the Department of Development of Newfoundland.

The research was to include:

1) reviews of available data sources (licences, sales records, etc.),

2) collections of baseline data on the ringed seal population - their distribution, movements and (ice) habitual preferences during the hunting season,

3) collection of baseline data on harvesting patterns - times of year, types of harvesting equipment, distribution of effort, and hunting success, and

4) collection of historic and baseline data on numbers of animals harvested, their utilization and their contributions to cash income, nutritional requirements and local culture.

In addition the 1982 icebreaking probe by the **Sir John Franklin** was monitored in an attempt to observe possible impacts from icebreaking on ringed seals.

The following report is divided into 4 sections. The first deals with the ringed seal itself - its numbers, distribution and effects of icebreaking upon it. The second section looks at seal hunting methods, seasons and locations and the impacts of icebreaking on hunting. The third section reviews the available seal harvest data and makes estimates on the cash and nutritional contributions the ringed seal harvest makes to some communities around Lake Melville. The fourth contains some conclusions and recommendations to government.

1.1 SHIPBOARD OBSERVATIONS - JANUARY 1982

1.1.1 INTRODUCTION

Prior to formalizing a contract with the Labrador Institute to conduct seal resource harvesting studies in Lake Melville, a member of the Institute was invited to be an observer on board the Canadian Coast Guard icebreaker **Sir John Franklin**. From January 7 to January 9 it operated between Rigolet and a location just south of Charley's Point in Lake Melville and then returned seaward over the same track (Figure 3).

1.1.2 METHODS

The onboard observer conducted spot checks for seals in the ship's track while the ship was moving forward and while it was stationary. Random visual surveys of the surrounding ice surface for up to 2-3 km in all directions from the bridge, the bow, the stern, and from the helicopter deck were undertaken at different times. The observer used 7x35 binoculars in conducting visual sweeps of the surrounding ice surface and the ship's track.

1.1.3 RESULTS

On January 7, one hour and ten minutes was spent looking for seals between the hours of 2:30 p.m. and 4 p.m., when dusk precluded further observation. Three 10-minute watches of the ship's track from the stern while the ship was in motion (speed approx. 14 knots) produced no observations of seals. One 10-minute watch of the ship's track from the stern while the ship was stopped (with engine idling) also produced no observations of seals (Figure 4). During observations from the helicopter deck one young harp seal was seen scuttling northward over the ice surface from a point within 50 m of the ship's track to a point estimated to be 200-300 m away from the track (Figure 3). The ship had apparently passed relatively close to this seal while it was on top of the ice and, when first seen, it was fleeing. This particular seal was

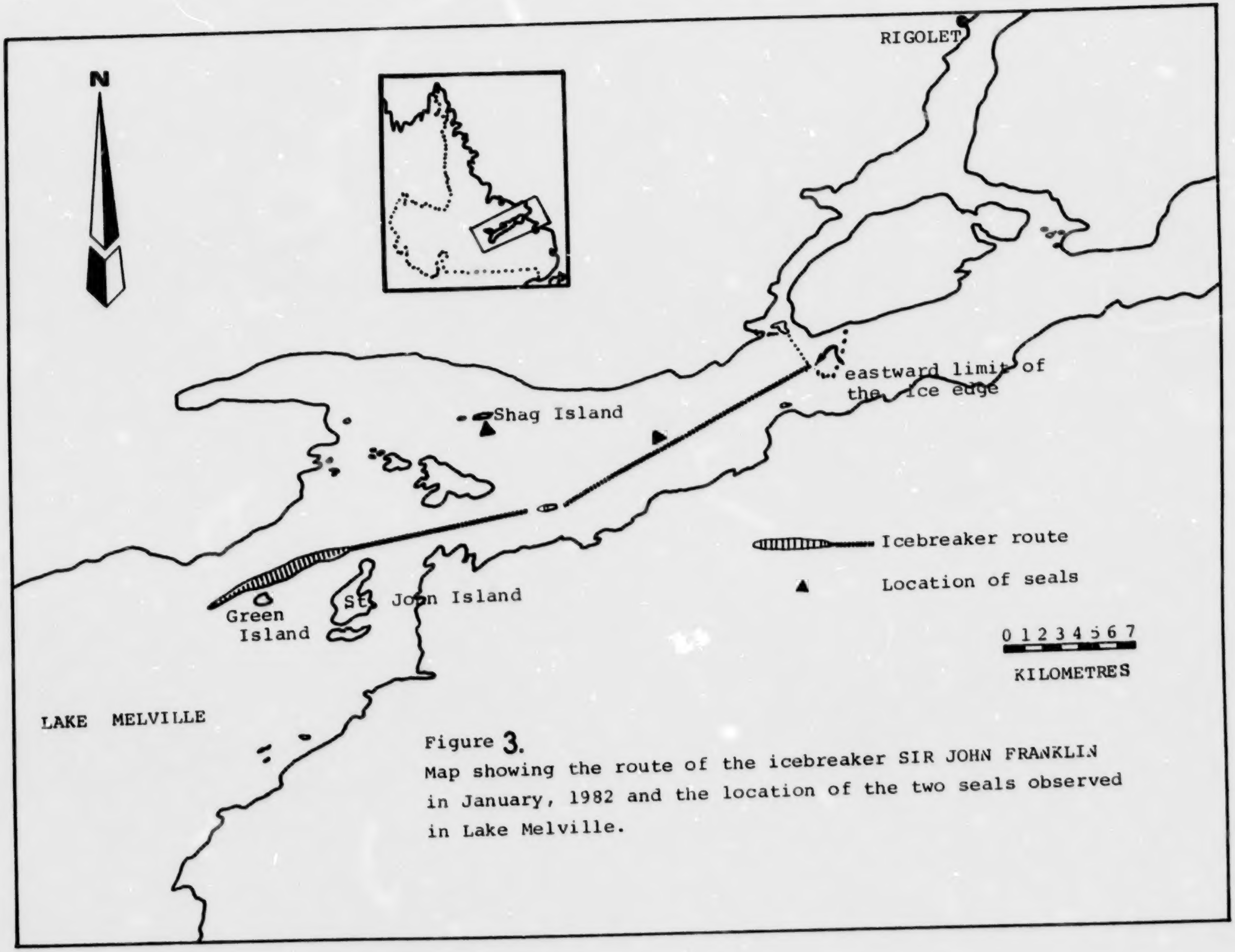

N
RIGOLET
eastward limit of the ice edge
Shag Island
St. John Island
Green Island
LAKE MELVILLE
Icebreaker route
Location of seals
0 1 2 3 4 5 6 7
KILOMETRES

Figure 3.
Map showing the route of the icebreaker SIR JOHN FRANKLIN in January, 1982 and the location of the two seals observed in Lake Melville.

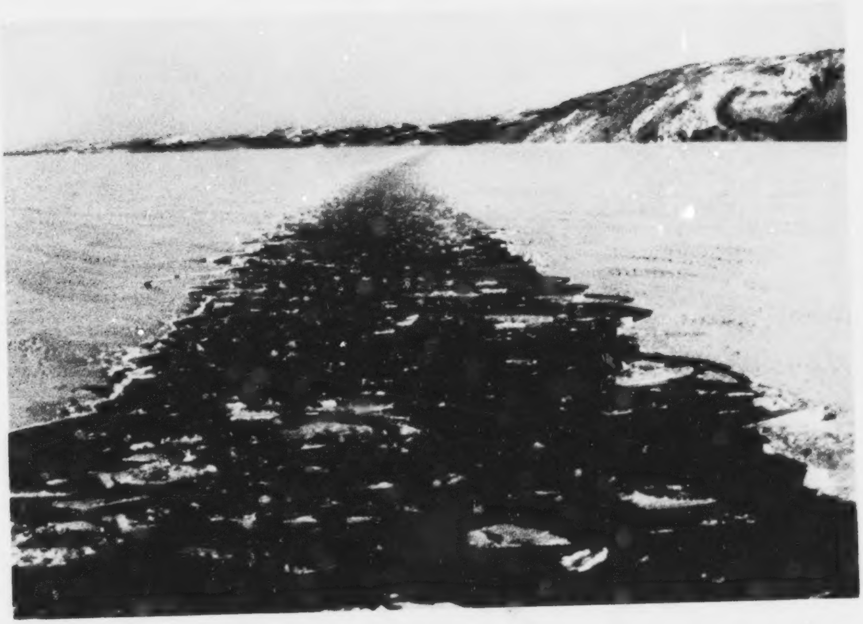


Figure 4.

Photograph from the stern of the icebreaker SIR JOHN FRANKLIN when the vessel was stationary, showing the freshly broken track through the ice just east of Neveisik Island in January, 1982.

killed by a member of the ship's ice party from Rigolet. He reported that the seal's flippers were severely frostbitten.

Harp seals in this condition are frequently encountered on the Lake Melville ice surface for some weeks after freeze-up. Locally they are termed "travellers". They are harp seals which have been driven out of the water by complete freeze up of the lake and are found generally in a starving and frostbitten condition, wandering over the ice surface searching for open water. If they do not locate the open water of the Narrows at Eskimo Island in the eastern end of the lake they then succumb to hunting, frostbite and/or starvation.

A second seal was observed on the same day at a great distance from the ship. This seal was located south of Shag Island (Figure 3) and appeared to be travelling eastward. The seals great distance precluded any judgement by the observer of its reaction to the ship.

On January 8, 3.3 hours was spent making observations from the ship. For the most part the observation periods were evenly split between the bow, the bridge and stern positions. The only animal life seen was one raven (**Corvus corax**) flying westward following the ship's track.

The Institute's observer spent the rest of the time assisting the ice crew in setting up markers and taking ice measurements near the ship's track, and making a helicopter survey of the ice and shoreline region between Sandy Cove and Green Island. No seals were observed during these sorties.

On January 7 and 8 discussions were held with Leonard Sheppard (member of the ice party and chairman of the Rigolet Community Council) on the subject of the community's concern with icebreaking navigation and associated environmental impacts. Arrangements were made for personnel from the Labrador Institute to visit Rigolet at a later date to discuss these subjects with the entire community council.

The Institute's observer left the ship at Rigolet on January 9.

On January 9, observations were made from the ice edge at Caravalla Point eastward as far as Rigolet. All observations were in water less than 1/10 ice covered. The observer saw only one seal during this segment of the trip. This seal, tentatively identified as a young harp, appeared ahead of the ship in open water. Several gulls (**Larus marinus** and **L. argentatus**) were also seen.

1.2 SURVEYS AND ICEBREAKER ACTIVITIES - MARCH 1982

1.2.1 INTRODUCTION

A researcher from the Labrador Institute and an assistant from Rigolet established a camp on Neveisik Island on March 21 to observe the **Sir John Franklin** during the period March 24 and 25 (see Figure 5).

The field party had originally intended to make observations of ringed seals in a polynya reported to form each spring, just south of Neveisik Island and in close proximity to the ship's route. No such polynya was observed to develop at any time in 1982. The field party therefore had to reorient and replan their research when the icebreaker was imminent. It was decided to:

1) visually monitor the ship's track by means of travelling along it on snowmobile and by periodic stationary observations,

2) record underwater, at varying distances, the sounds of the ship breaking ice,

3) collect underwater sounds of seals at Caravalla Point, and

4) make any other general observations pertinent to the study which opportunity might permit.

This section will deal with items #1 and #4 above. The underwater recordings have not been adequately analyzed to enable reporting.

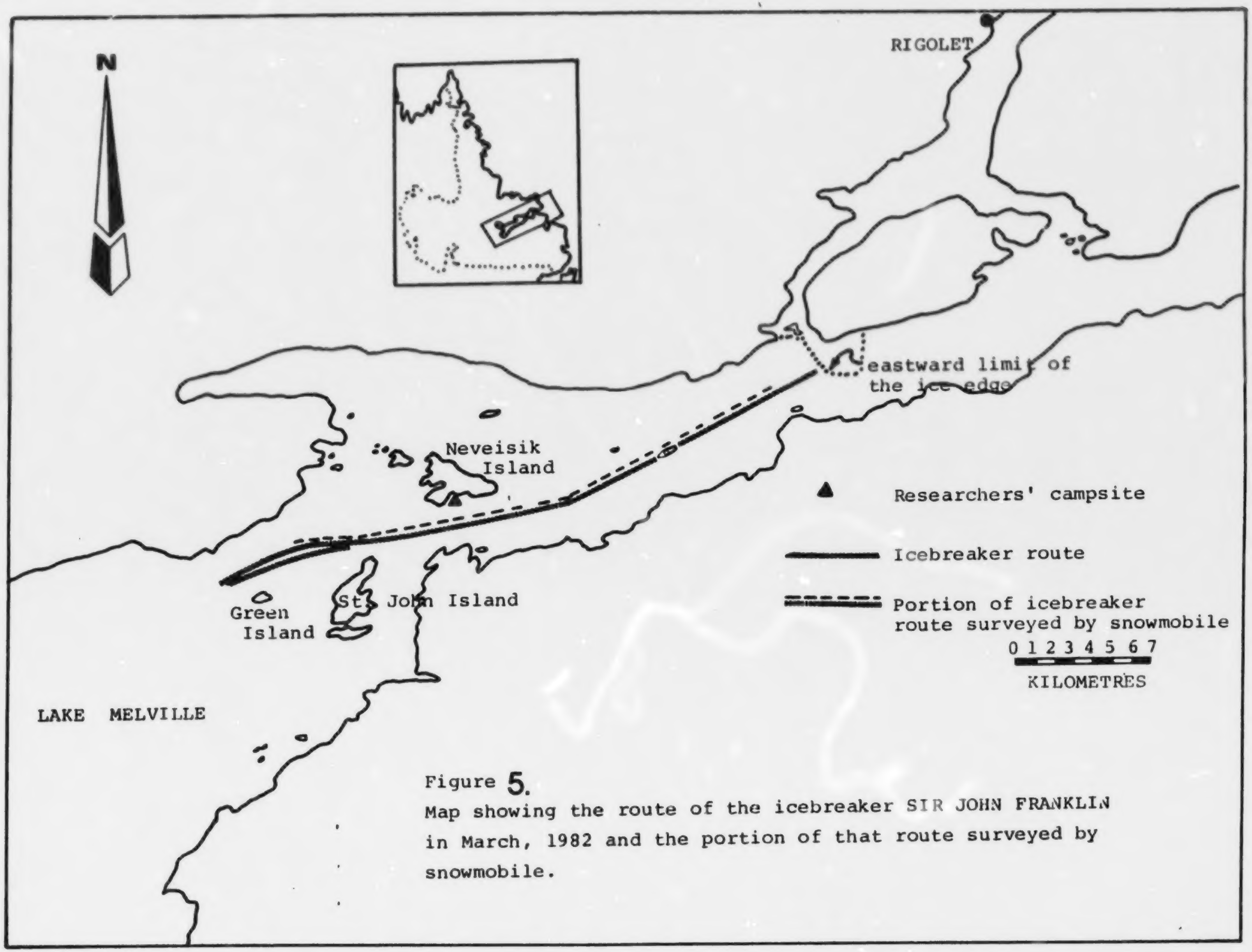

N
RIGOLET
eastward limit of
the ice edge
Neveisik
Island
St. John Island
Green
Island
LAKE MELVILLE
▲ Researchers' campsite
Icebreaker route
Portion of icebreaker
route surveyed by snowmobile
0 1 2 3 4 5 6 7
KILOMETRES

Figure 5.
Map showing the route of the icebreaker SIR JOHN FRANKLIN in March, 1982 and the portion of that route surveyed by snowmobile.

1.2.2 METHODS

The icebreaker **Sir John Franklin** entered the fast ice at Eskimo Island on the evening of March 23 and later anchored itself in the ice a few miles ESE of Neveisik Island. The vessel was underway early on the morning of the 24th. and co-operated with the Institute's research team in the making of underice sound recordings at varying distances from the ship. The recordings were completed by 8:30 a.m. and the vessel proceeded eastward breaking ice to just west of Green Island (Figure 6).

Within two hours of the ship passing, one observer started travelling by snowmobile along the northerly edge of the ship's track from 58° 51' W (Neveisik Island) to as far as 58° 58' W. The track was filled primarily with broken ice or freshly forming skim ice with occasionally occurring extensive open water areas. Three such open water areas existed between Neveisik Island and Charley's Point. These varied in extent from approximately 150 sq. m (540 sq. ft.) to 500 sq. m (5300 sq. ft.) in area. (Track width was estimated in the field to be 18.3 m or 60 ft.).

1.2.3 RESULTS

One 10-minute observation was made at each of the open areas in the ship's track when the vessel was over 3 km away. No seals or other animals were observed in or around the open water areas. Similarily a slow, painstaking patrol by snowmobile along the track from Neveisik Island to the ship, when it was off Green Island, produced no sightings or evidence of seals.

The vessel left the lake in the evening of the 24th. and on March 25th. the field party broke camp and moved into Rigolet. Enroute they patrolled the northerly edge of the ship's track for a distance of approximately 16 km. between Neveisik Island and Caravalla Point. The only sign of animal life encountered along the ship's track was two ravens flying westward.

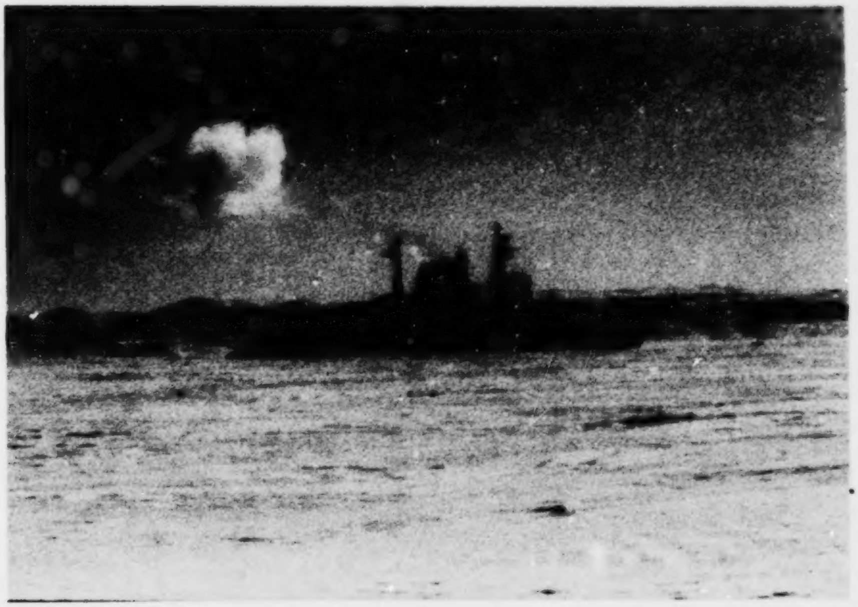


Figure 6.
Icebreaker SIR JOHN FRANKLIN operating near Green Island in Lake Melville on March 24, 1982.

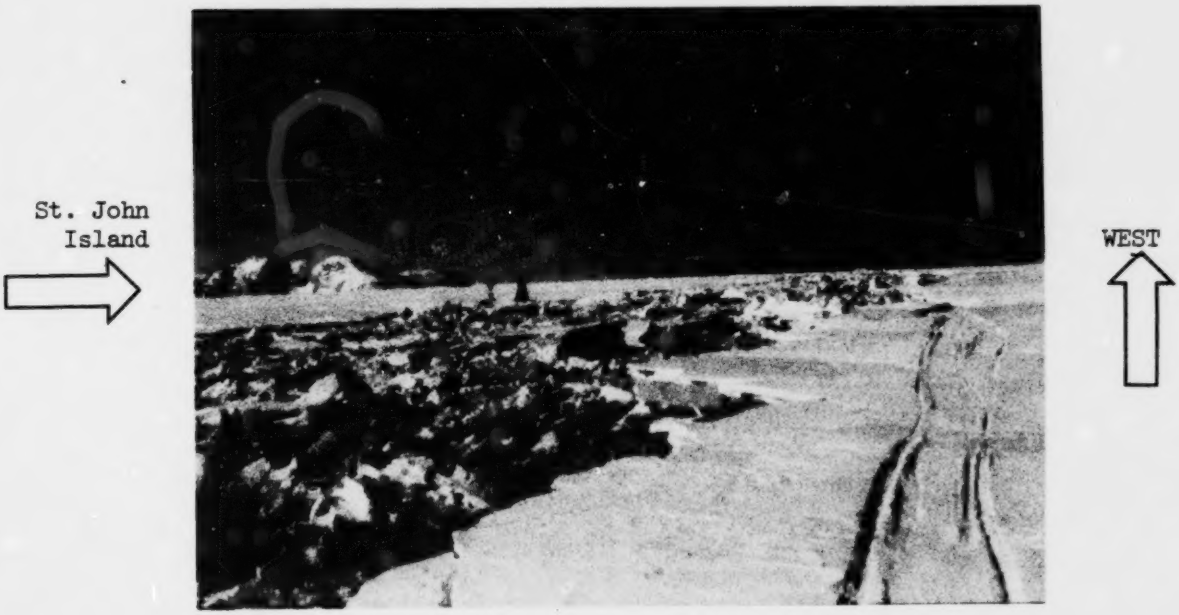


Figure 7.
Example of track through ice left by the icebreaker SIR JOHN FRANKLIN on its entry leg of the Lake Melville voyage on March 24, 1982. Note edge of track for comparison with figures 8a and 8b.

While travelling along the ship's track on March 25 the field party noted a substantial difference in the track configuration from that which they had observed midday on the 24th.

When the vessel had entered the lake on March 23 the track was a more or less clean slice through the ice (Figure 7). This had created limited (visible) fracturing at various angles to the track, resulting in cracks 10-20 cm (4-8 in.) wide which extended for a distance of up to 8 m (26 ft.) from the track edge. The day after the icebreaker left (March 25) the same area showed regular and highly visible cracking of up to 1 m (3 ft.) in width extending more than 50 m (165 ft.) from the track (Figures 8a and 8b). This increased cracking was thought to be a result of the more rapid exit of the vessel from the lake generating a larger wake which in turn either created or magnified the extensive ice fracture pattern.

Upon reaching Caravalla Point the party tape-recorded and observed seals at the ice edge. Within a 15 minute period two harp seals and four ringed seals were observed at the ice edge.

On March 26 the field party returned to Caravalla Point. In three hours of tape-recording and observing, three ringed seals and one harp seal were observed. Co-incidentally a party of two snowmobiles from Rigolet was observed through binoculars as they crossed the ship's track at an approximate location of 58° 35' 00"W, 54° 01' 30"N, 40-42 hours after the departure of the icebreaker. The party used extreme caution and dispersed their loads when crossing the track. This crossing followed a period of moderate temperatures (-5 to +8° C), winds of 12-30 knots and overcast skies (as measured at Goose Bay Airport).

1.2.4 DISCUSSION

Based on anecdotal reports of the icebreaking experiment in February and March 1981, the researchers were prepared to possibly observe ringed seal pups in the ship's track after or during the March 1982 transit. In 1982 local hunters and workers on the 1981 Lake Melville ice probe had

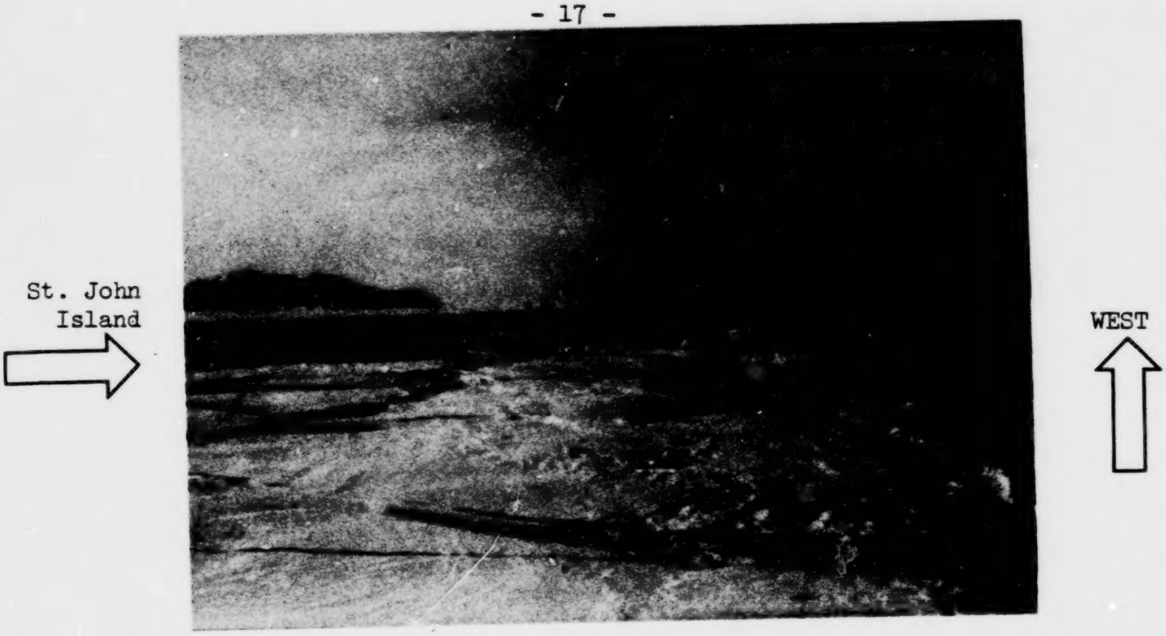


Figure 8a.
Example of the track left by the icebreaker SIR JOHN FRANKLIN on its exit leg of the Lake Melville voyage, March 24, 1982. Note extensive cracking of ice away from the ship's track.

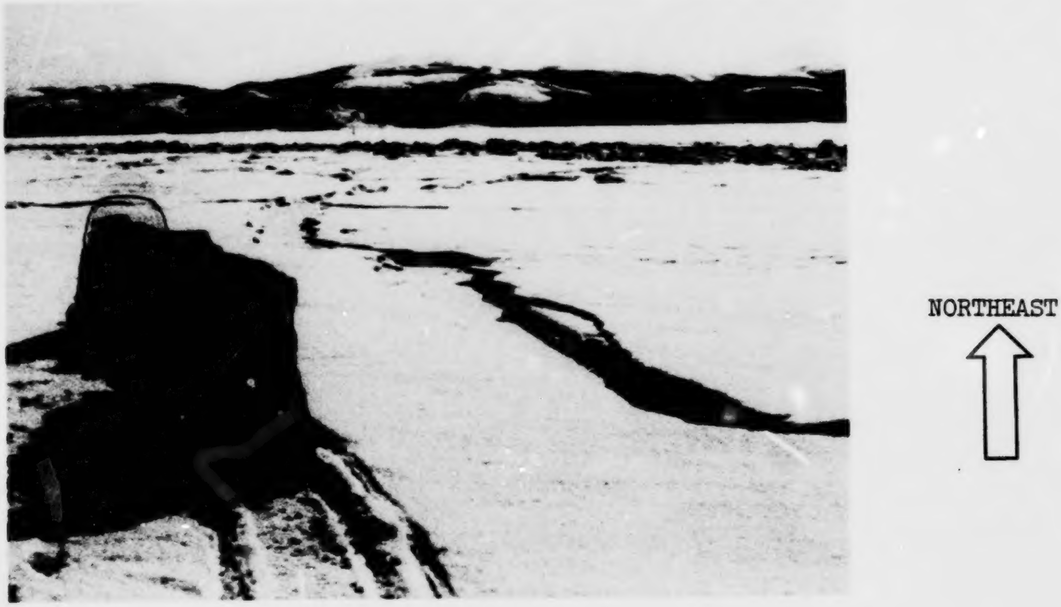


Figure 8b.
Example of the track left by the icebreaker SIR JOHN FRANKLIN on its exit leg of the Lake Melville voyage, March 24, 1982. Note the size and extent of the cracking of ice away from the ship's track.

reported to the Institute researchers that on a few of occasions, while working on the ice along the fresh track, they had found white coat ringed seal pups. They suspected that the birth lairs of these pups has been broken open by the icebreaker and the pups subsequently exposed.

The February-March 1981 voyages of the **M.V. Arctic** and CGS **Sir John Franklin** had extended as far as Epinette Point in Lake Melville, a distance of about 100 km (62 miles). In addition to a straight course towards Epinette Point, the vessels had indulged in several side trips to conduct various icebreaking tests. This had chopped up a much larger area of ice than a more normal icebreaking endeavor would be expected to do.

The 1982 March voyage of the **Sir John Franklin** had entered the narrows at St. John Island early on March 24, penetrated only as far as Charley's Point (a distance of about 35 km - 22 miles) and then left the lake on the evening of the same day. No seals, pups or adults, were observed during the March 1982 transit of the icebreaker.

Local hunters report that ringed seals would be expected to whelp in late February-early March in the area around Green Island and only as far east as St. John Island. Rarely are birth lairs encountered east of this point due to the general absence of pressure ridges, the sites preferred for birth lairs.

Aerial surveys in the spring of 1982 saw no melted out lairs east of St. John Island. The vessel's route, fortuitously, did not go through any major concentration of birth lairs later identified around Green Island (sse section 1.4). Two haul-out lairs were found in close association with the eastern extent of the ship's March track. The two haul-out lairs appeared to have been located in direct response to the ice conditions in the ship's track.

A Rigolet hunter reported that in March 1981, a few days after the **M.V. Arctic** and **CGS Sir John Franklin** left the lake, he found that many, (less than 50), ringed seals had whelped on bare sina ice, east of

Rigolet in Groswater Bay. His explanation for this event, the first he had ever experienced in that area in many years of hunting, was that the about-to-whelp female ringed seals were either frightened or their birth lairs were destroyed by the icebreaker when it was in the ice of Lake Melville. Their subsequent reaction, he supposed, had been to follow the ship's track to Groswater Bay, and when there was no option, whelp on the bare ice of the sina. The Rigolet hunter showed photographs of these seals to the researcher as proof of his experience.

It is reasonable to conclude that any lair in the icebreaker's path would be destroyed. It is also quite reasonable to conclude that, in the widely ranging trip of the **M.V. Arctic** through Lake Melville in 1981, the icebreaker might well have come in contact with some birth lairs. If so, the seal pups that were seen on the track edge were probably a result of disturbance or destruction of their birth lairs. Whether or not the ringed seals which whelped on Groswater Bay sina ice in 1981 did so as a result of icebreaker traffic is a moot point. The timing, and the fact that such an event had not been witnessed before by the experienced hunter, does raise serious and valid questions about the impact of icebreaking on ringed seals about to whelp.

The only other wildlife noted to associate with the ship's track in 1982 were ravens. In January, one had been observed following the ship's track, and in March, two were seen following the same route. In each case they appeared to be looking for food.

As noted previously the fracture pattern of the ice, created probably by the wake of the rapidly exiting ship, was quite extensive. In places these cracks were large enough for a man to easily pass through. A hunter from Rigolet related to the researcher how he had fallen through such a crack in 1981 when it was drifted over with snow but not frozen at water level. Extended clear cold weather shortly after the icebreaker departs makes the track and the cracks refreeze relatively quickly and solidly. If a snowfall or drifting snow occurs shortly after the icebreaker passes it becomes dangerous for hunters or travellers to approach or try to cross the track because of the unknown location of the cracks. The danger is compounded by limited refreezing.

The party observed crossing the track near Caravalla Point were doing so 40-42 hours after the icebreaker had passed. The intervening period had not been excessively cold (-5 to +8° C) and no snow had fallen.

1.3 AERIAL SURVEYS OF SEALS ON THE SHIP'S TRACK

1.3.1 INTRODUCTION

Aerial surveys of the ship's icebreaking track were conducted separately in a systematic and a general manner. The set of systematic surveys aimed at making numerical comparisons between the number of seals in a given area in and around the ship's track and nearby undisturbed areas. Another set of general observations was made whenever Labrador Institute researchers were in the vicinity of the ship's track. These observations noted the general location and numbers of ringed seals on or adjacent to the ship's track.

1.3.2 METHODS

1.3.2.1 SYSTEMATIC SURVEYS

In early April, a two-man field party marked and measured survey transects on the ice from Neveisik Island westward between Green Island and the north shore of Lake Melville, and between Green Island and St. John Island (see Figure 9). All but one survey transit were 5.4 km (3.4 miles) in length and marked with numerous numbered orange plywood markers raised on high poles (Figure 10). The one exception was survey transect #7 which was 4.95 km (3.1 miles) in length. The raised orange markers permitted an aircraft pilot to readily fly a predetermined and continuous survey line over the otherwise generally featureless ice, and enabled observers in the aircraft to relate their observations to particular areas.

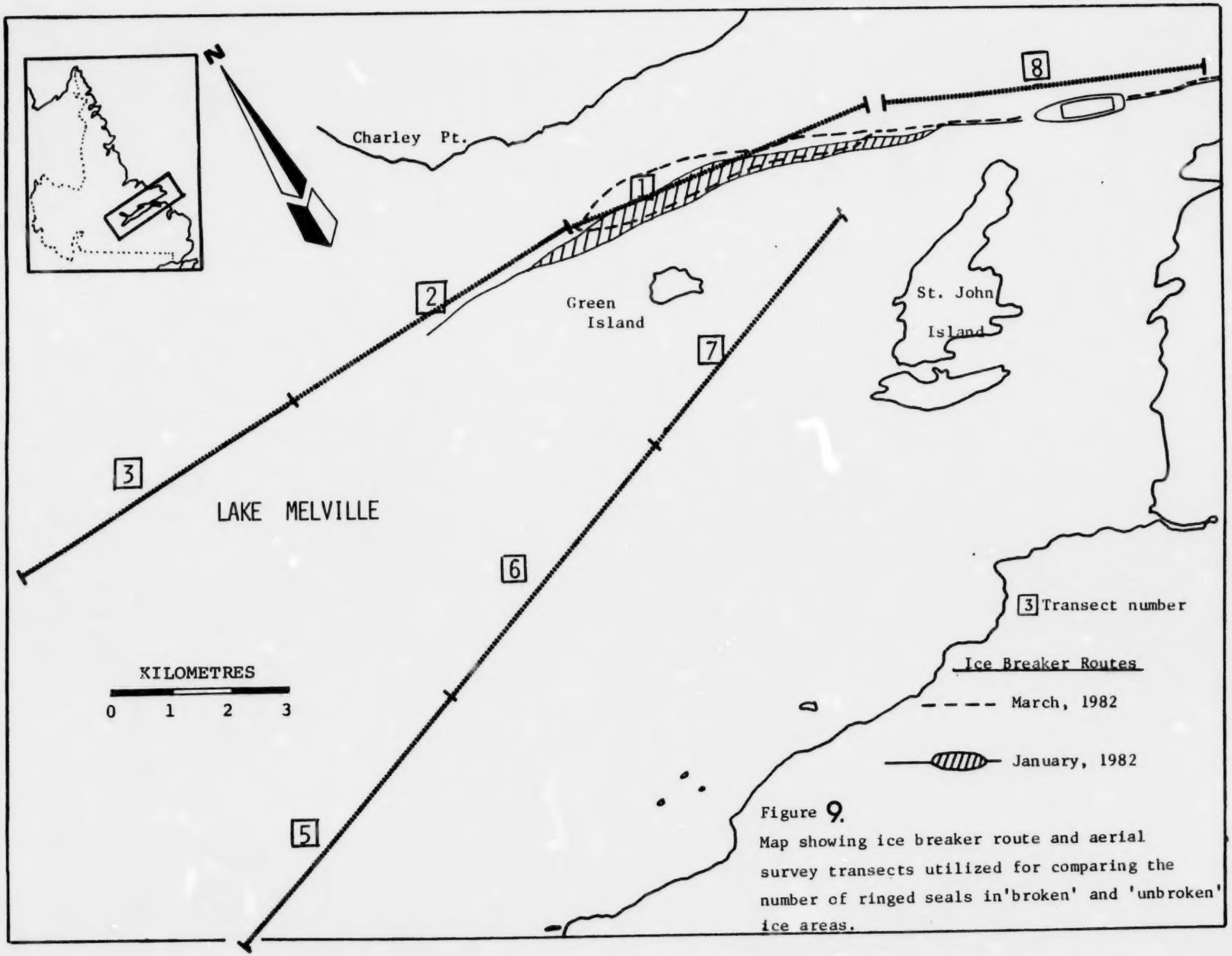

N
Charley Pt.
1
2
3
5
6
7
8
Green Island
St. John Island
LAKE MELVILLE
KILOMETRES
0 1 2 3
3 Transect number
Ice Breaker Routes
March, 1982
January, 1982

Figure 9.
Map showing ice breaker route and aerial survey transects utilized for comparing the number of ringed seals in'broken' and 'unbroken' ice areas.

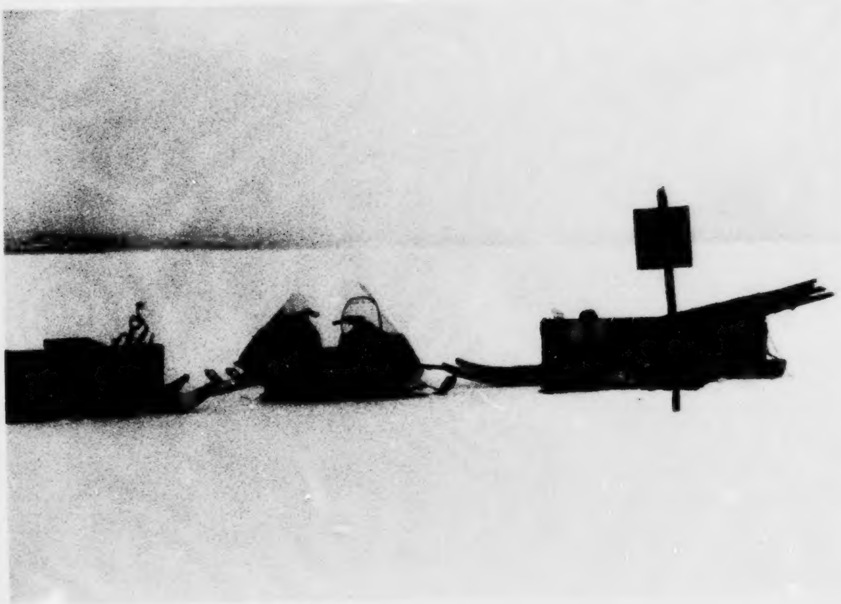


Figure 10.

Photograph showing the type of transect marker placed on the ice for use in aerial surveying.

Transects #1, #2 and #8 closely paralleled the ship's tracks made in January and March, 1982. They also continued for some few kilometres beyond the ship's track (Figure 9). The transects between Green Island and St. John Island (5, 6, 7) and transect #3 were in an area undisturbed by the ship and served as controls for making comparative observations.

Systematic aerial surveys were attempted on April 13, April 21, and May 16 and May 23. On April 13, survey work in a fixed wing aircraft had to be abandoned in its early stages when the form of aircraft was found to be unsuitable. Later surveys (April 21 and May 23) were conducted satisfactorily using a helicopter. On May 16 localized weather conditions prevented a systematic survey of the ship's track.

Aerial surveys were flown at an altitude of 152.5 m (300 ft.). Strip width was controlled by means of horizontal strips of tape placed on the bubble windows of the helicopter by each observer when the helicopter was hovering over known distance reference points. The observation strip width for each observer was estimated to be 300 m (572 ft.). Each survey "plot" (excluding #7) was therefore, calculated as being 5,400 x 600 m (9,752 x 1112 ft.) in size. Surveys varied in starting at the east or west end of the survey lines depending on wind conditions.

The two rear observers recorded the number of seals in the survey strip while the pilot and a front observer kept the rear observers notified of the start and finish of each survey section and any seals diving down their holes ahead of the aircraft.

1.3.2.2 GENERAL SURVEYS

During other aerial surveys of Lake Melville, observers recorded the number and location of ringed seals on and adjacent to the ship's track. Observations were made from a wide variety of altitudes in varying weather conditions, and from both fixed wing aircraft and helicopters.

1.3.3 RESULTS

Systematic surveys for ringed seals in plots on the ship's track and in undisturbed control areas were conducted successfully on April 21 and May 23. The resulting observed densities of ringed seals for each survey plot are listed in Table 1. (Appendix A lists the data.)

A Mann-Whitney U test comparing the observed density levels of ringed seals in plots where icebreaking had taken place in January and March, 1982 (plots 1 and 8) with plots where no icebreaking had taken place (plots 3, 5, 6 and 7) showed no significant difference at the 95% confidence level.

April 21 survey: $P > 0.05$, $T=.133$, $U=0.5$
May 23 survey: $P > 0.05$, $T=0.1$, $U=.266$

General observations of ringed seals on the ship's track were made from aircraft on April 12, April 26 and May 16.

On April 12, during a fixed-wing flight from Caravalla Point to the west end of the ship's track, 44 ringed seals were observed to be hauled-out on top of the ice in the ship's track (Figure 11). No seals were observed away from the ship's track within approximately 1 km. The seals were generally in groups of 1 or 2 or in large aggregations (13, 20) (Table 2).

On April 26, from Caravalla Point to the west end of the ship's track, 49 seals were observed to be hauled-out on the ice in the ship's track (Figure 11). Again no seals were observed to be off the track within approximately 1 km.

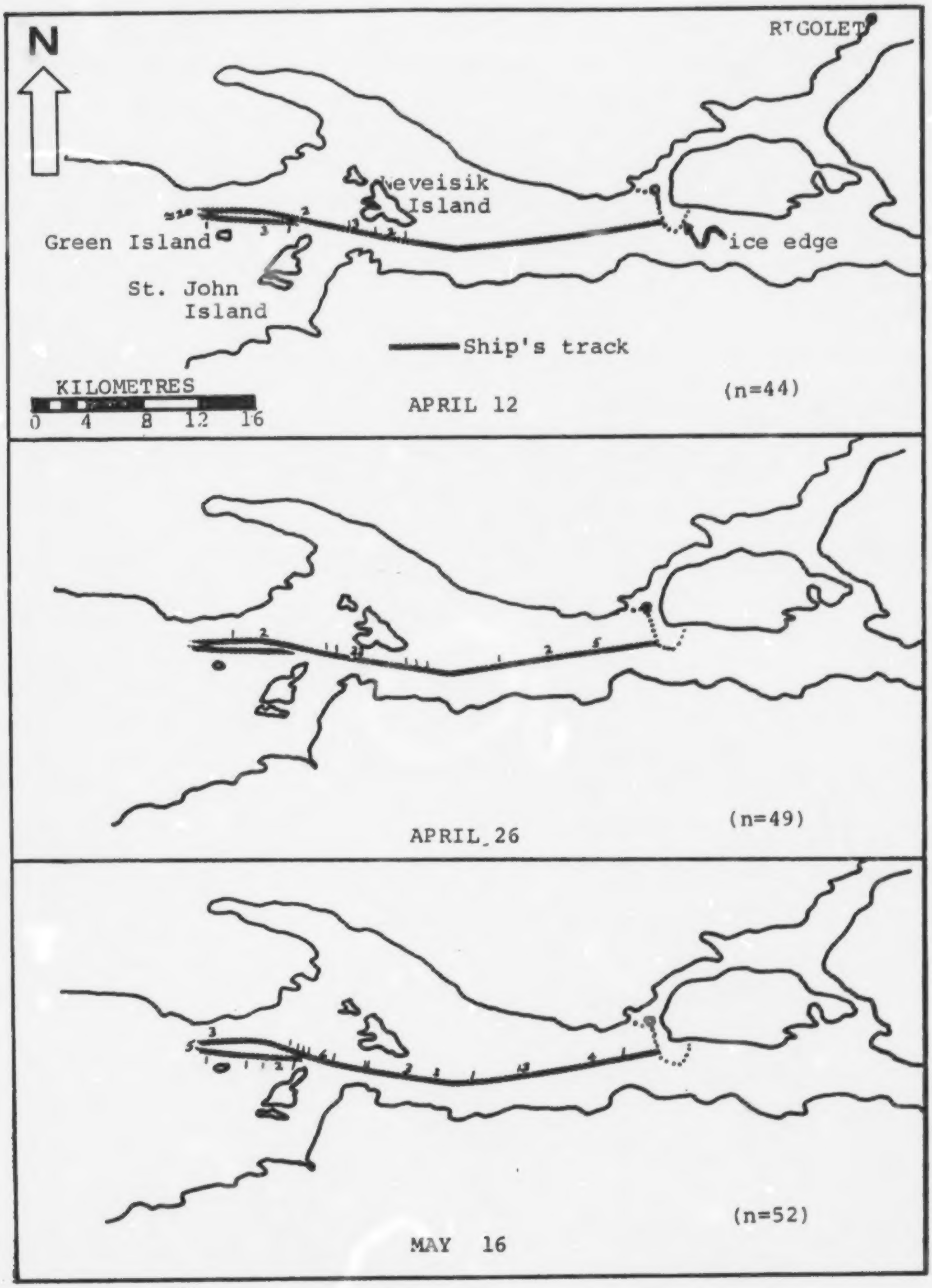

N
RIGOLET
Neveisik
Island
Green Island
ice edge
St. John
Island
Ship's track
KILOMETRES
0
4
8
12
16
APRIL 12
(n=44)
APRIL 26
(n=49)
(n=52)
MAY 16

Figure 11.
Numbers and distribution of ringed seals observed on the ship's track during general aerial surveys in April and May, 1982.

TABLE 1

Densities of Ringed Seals Observed on Survey Plots in Lake Melville in April and May, 1982.

	Ringed Seals/sq.km			
Survey Plot #	April 13	April 21	May 23	Plot History
1	1.54	0.62	8.64	A
2	*	0	1.85	B
3	*	0	0.62	C
5	*	0.62	4.94	C
6	*	0	0.93	C
7	*	0	1.68	C
8	*	0	11.73	A

* Not surveyed

A - Icebreaker activity occurred in January and March, 1982.

B - Icebreaker activity occurred in January, 1982.

C - No icebreaker activity in 1982.

TABLE 2

Group Sizes of Ringed Seals Observed to be Hauled-out on the Ship's Track During 1982 General Surveys.

April 12	April 26	May 16	
1	5	1	
2	2		4
1	1	13	
13	1		1
2	1	3	
1	1		3
3	33	1	
1	1		1
20 (approx.)	1	1	
--	2		6
44	1	3	
	--		1
	49	1	
			1
		2	
			1
		1	
			1
		1	
			1
		5	

		52	

On May 16, a survey of the ship's track was completed during overcast and rainy conditions. A total of 56 seals were observed in the ship's track area that morning: 52 on the track and four away from but within 1 km of the track. Figure 11 shows the distribution of the observations along the 35 km (22 miles) of ship's track. Contrasting data collected on the way out to the track area from North West River to Green Island, a distance of approximately 85 km (53 miles) and with no icebreaking history in 1982, showed that a total of 17 seals were hauled out on the flight route taken.

1.3.4 DISCUSSION

The observations provide a strong subjective indication that icebreaking can have an effect on density and distribution but do not prove the case statistically. A statistical analysis of the density levels in the haul-out season determined from the systematic surveys of areas where icebreaking had taken place in January and March, 1982 and the undisturbed areas did not show a statistically significant difference on April 21 and May 23. (Mann-Whitney U test: Apr. 21: $P>0.05$, $T=.133$, $U=0.5$. May 23: $P>0.05$, $T=.1$, $U=0.266$). The number of surveys was somewhat limited ($n=2$) and this would be an important factor in refining and determining whether there was indeed a significant difference in density levels of seals that could be categorically attributed to icebreaking.

Alliston (1980) found densities of ringed seals hauled-out on icebreaking tracks in the arctic to be initially higher, and then later to be as high or higher than surrounding undisturbed areas. Our study suggests a consistently higher density throughout the haul-out season on the ship's track.

Our general surveys strongly suggest an inclination for ringed seals to use the ship's track. The results from the three general surveys show that of the 149 seals observed in the vicinity of the track, only four were off but within 1 km of the track.

Surveys of icebreaker tracks in Lake Melville in 1981 (Alliston, 1981) established that ringed seals did occupy and maintain breathing holes in the broken ice resulting from late February and early March experimental icebreaking. Alliston's data suggested that breathing hole densities were much higher in the ship's track than in adjacent, unbroken fast ice. Our 1982 study, although counting seals rather than seal holes, generally concurs with Alliston's findings. It should be noted however that both studies suffer from limited sample size and lack of sufficient repetition.

The question arises: where did these seals come from prior to their congregating on the ship's track? Three sources are most likely.

Except for the area west of St. John Island (58° 45'W) the general zone of the 1982 ship's track is not considered by hunters to be a good ringed seal wintering area, primarily due to the low number of pressure cracks and ridges in the central areas.

Ringed seals inhabit the open water area east of Caravalla Point all winter. During the brief underwater tape-recording sessions there in late March the researcher saw several ringed seals, along with some harp seals. Ringed seals are also relatively numerous in Groswater Bay and Rigolet hunters regularly hunt them there in winter months. The hunters also report that normally, as the haul-out season (April- early June) progresses, ringed seals become fewer in Groswater Bay and more abundant at Caravalla Point and westward. The cracking of the ice along the immediate edges of the track (as described in section 1.2.3) and the tumult of broken ice in the track after the icebreaker has passed provides many opportunities for the establishment of new breathing holes by seals either resident or moving into the area from Groswater Bay (Figures 12a,b).

Ringed seals are reported by Rigolet hunters to be numerous along the shore/ice interface of the eastern and narrow portion of the lake because a lead created by the rising and falling of tides exists there all winter (see section 2.4.2.1). Local hunters have reported that past transits

Figure 12a.

Photograph taken on May 16 near Neveisik Island of ship's track showing numerous seal holes established after the passing of the icebreaker SIR JOHN FRANKLIN in late March, 1982.

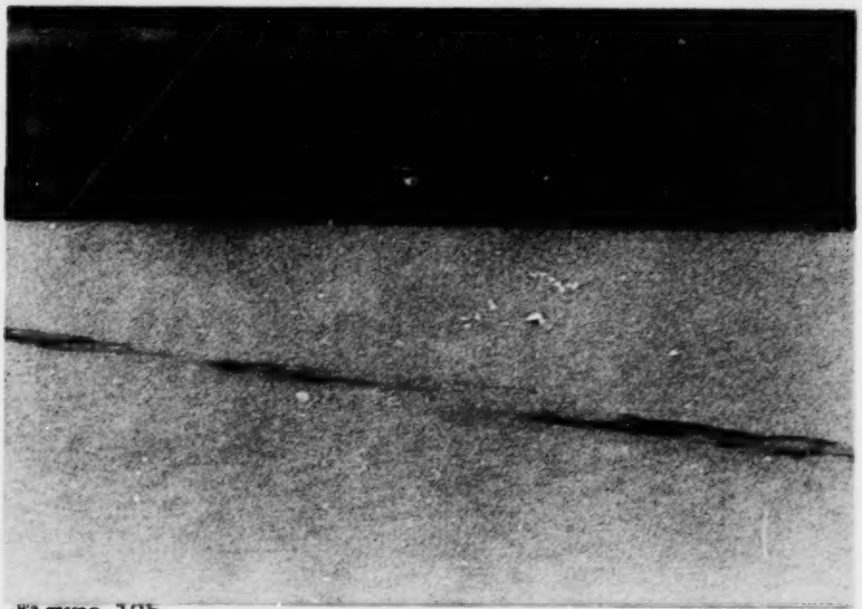


Figure 12b.

Photograph taken on April 12 showing ringed seals hauled-out on the frozen over ship's track just west of Neveisik Island.

of icebreakers between Carrington Island (58° 36'W) and St. John Island (58° 54'W) caused the ice over this lead to collapse, impelling the seals to move to other areas including the ship's track.

Lake Melville, west of Green Island, has a substantial population of ringed seals. Seals from the general expanse of the lake may have located the ship's track and then elected to remain in the vicinity.

The first seal reported in 1982 to the researchers as "hauled-out" was on March 24 near Carrington Island. Subsequent to that no reports were made until April 6 when several widely scattered seals were seen along the north shore of Lake Melville. No seals were seen east of Green Island at this time. The first seals recorded hauled-out on the ship's track were seen during the April 12 survey west of Neveisik Island. Of the 44 observed that day, there was one large group of about 20 at the westerly extremes of the March track. During the April 26 general survey, 49 seals were seen on the ship's track, including a group of 33 just south of Neveisik Island. Between Neveisik Island and eastward to Caravalla Point 11 seals were on the track, while west of Neveisik Island 5 seals were on the track. On May 16, 25 seals were seen on the ship's track east of Neveisik Island and another 27 were on the track to the west of the island (Figure 11). Four seals were seen in the eastern section, off the track, but they were within 1 km of the track.

These observations lead to the suggestion that seal numbers built up in the west end of the track first (April 12). Fourteen days later a large concentration had built up off Neveisik Island while numbers in the west had declined. Twenty days after that we found the seals scattered singly and in groups the length of the track, with numbers tending to be at their highest in the east and west but not the central portion of the track.

If these shifts in numbers are indicative of an impact from icebreaking, it may be hypothesized that as a result of icebreaking or the presence of the ship's track seals moved generally from west to east along the track, and also, that at least initially seals came from somewhere towards the central and western portions of the track. The most likely source of these seals would be from the shore-ice interface if the lead there was closed by some event, such as icebreaking or, from the ice areas surrounding the track west of St. John Island. Late in April seal numbers were found to be increasing in the eastern extent of the track, possibly indicating the annual spring haul-out sift from Groswater Bay to Lake Melville or, conversly the movement of seals from Lake Melville towards Groswater Bay. Some seal hunters believe that ringed seals follow icebreaker tracks to the open water of the Narrows and Groswater Bay.

Our surveys provide no definitive support either to the stated hypothesis or the hunters' concepts, however, they do illustrate the phenomena of seals congregating and concentrating along the ship's track (Figures 12a, 12b) and increases, generally and progressively eastward, in seal numbers over a five week period, beginning 3 weeks after the ice-breaking events.

1.4 SURVEY OF RINGED SEAL LAIRS

1.4.1 INTRODUCTION

A survey of ringed seal lairs was conducted in the area of icebreaking north of Green Island and in the undisturbed area south of Green Island. The objective was to map the location of the lairs in relation to the 1982 zone of navigational ice-breaking, in order to observe lair distribution and make comparisons with other undisturbed areas.

Two basic types of ringed seal lairs are thought to exist. These are birth lairs where the female bears and suckles her single pup, and haul-out lairs, which are thought to be used by seals not bearing young. Smith and Stirling (1975) discuss in detail the origin, structure and variety of ringed seal lairs.

1.4.2 METHODS

On the morning of May 9, 1982, two observers flew survey lines in a helicopter back and forth across the study area mapping the general location and determining the types of all lairs visible. Care was taken to try to survey when the roofs of the lairs had only recently melted off, and therefore the lairs could be distinguished from breathing holes. A lair was identified as the birth type if it contained the shed lanugo (birth hair) of the pup. The shed lanugo created a brownish cast to the interior of the lair (Figure 13) which could be readily seen at altitudes of 120 to 150 m. In the case of lairs where there was some doubt, the helicopter would descend to within 15 to 20 m of the lair for a closer inspection. Dens which did not contain lanugo were designated as haul out lairs.

The general location of the lairs were marked on a 1:50,000 marine chart using surrounding land masses and the ship's track as land marks.

1.4.3 RESULTS

A total of 30 birth lairs and 21 haul-out lairs were located in an area of approximately 60 sq. km (23 sq. miles) between St. John Island and Charley's Point (Figure 14).

1.4.4 DISCUSSION

Lairs of ringed seals are often found in small clusters over much of Lake Melville. In general, they are associated with pressure ridges created by rafting ice.

In this study no systematic investigation of lairs was conducted beyond that of locating them in the Green Island area and designating them as birth or haul-out lairs.

Local hunters reported that they thought the whelping season of the ringed seal starts sometime in February or early March and that pups are still associated with their mothers in early April. Anecdotal reports from the 1981 icebreaking activities indicate that ringed seal pups in

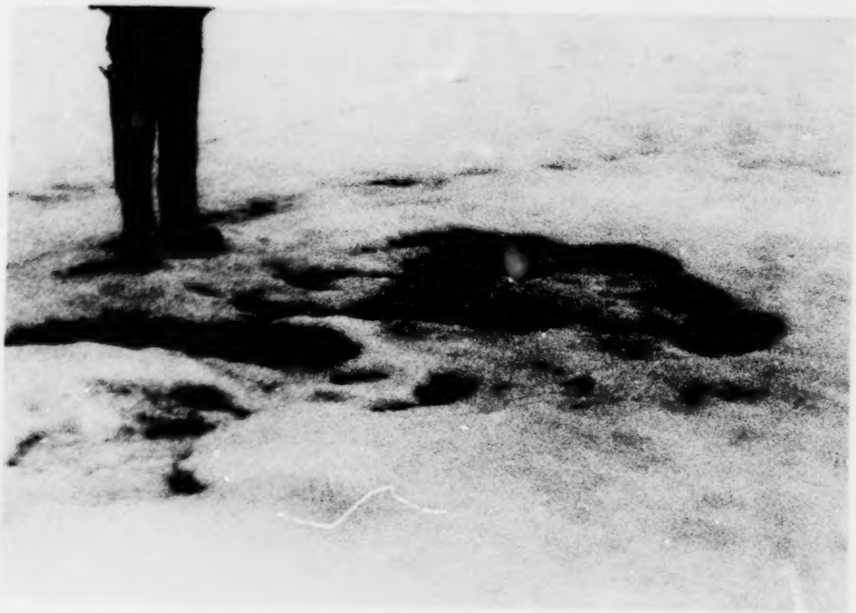


Figure 13.

Photograph showing a melted out ringed seal birth lair. The lanugo, or birth hair, can be seen as a light brown stain on the floor of the lair.

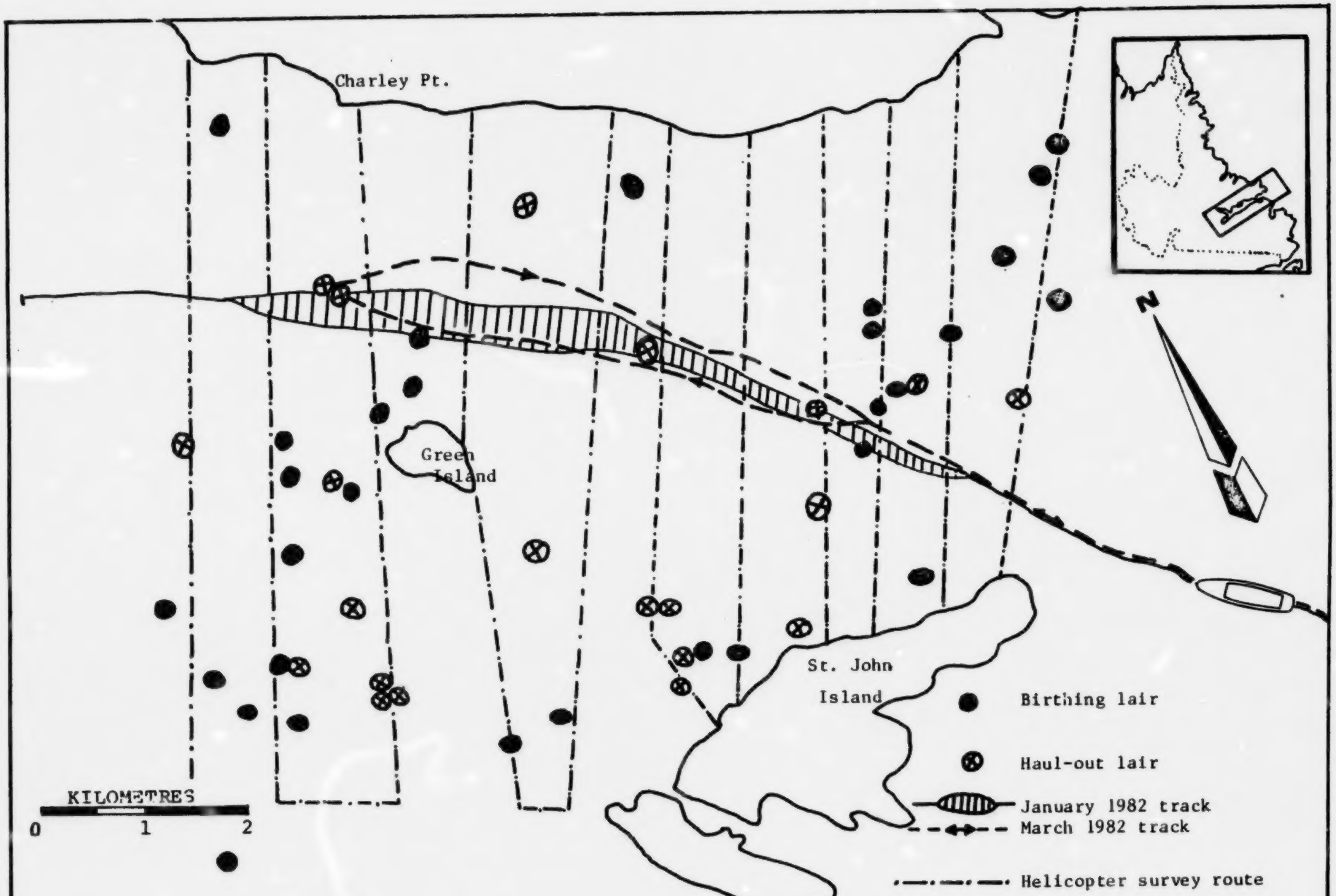

Charley Pt.
N
Green Island
St. John Island
KILOMETRES
0
1
2
Birthing lair
Haul-out lair
January 1982 track
March 1982 track
Helicopter survey route

Figure 14.
Map showing the location of ringed seal lairs and ice breaker tracks near Green Island, Lake Melville, Labrador on 9 May, 1982.

Lake Melville would still be white-coats in early March. C. Lethbridge (pers. comm.) feels that moulting of the birth hair is complete by early April. Mansfield (1967) states that ringed seal pups begin to shed their white foetal coat (lanugo) two weeks after birth and this moult is probably complete within about six weeks. Therefore in 1982 the ice breaker may have been operating in the Green Island area in the latter part of the whitecoat phase of ringed seal pups.

Aerial surveys on May 9, 1982 determined the general location of ringed seal birth and haul-out lairs in the Green Island area relative to the location of the ship's track. No birth lairs were identified in or immediately adjacent to the March track; however, two were on the edge of the January track. No evidence of the icebreaker destroying any lairs was found, but such evidence, if it existed, would be virtually indistinguishable from the rubble of the ship's track unless the evidence was in the form of a seal pup.

Birth lairs would have been in 'position' prior to the icebreaker passing on 24 March. A subjective judgement of the distribution of birth lairs could not determine a distinctly different pattern of distribution in the icebreaking area (or within 1 km) compared to undisturbed areas (ie: more than 1 km away). However, on a density basis, the icebroken area had a slightly lower value (about 2.2 birth lairs/km^2) than the undisturbed area (about 2 birth lairs/km^2).

The mapping of the distribution of the haul-out lairs showed that slightly more haul-out lairs appeared to be in the undisturbed area (2.94/km^2) than in the icebroken area (2.75/km^2).

Two haul-out lairs were found in direct association with the ship's track and were obviously made after the icebreaker had left the area. One other haul-out lair was located between the March entry and exit tracks.

The slight difference in densities of birth or haul- out lairs are not considered substantial or indicative by the authors since habitat factors such as the density and intensity of ice ridging are not known or considered and these, and other factors, would be expected to exert considerable influence on the distribution of lairs.

1.5 AERIAL COUNTS OF LAKE MELVILLE RINGED SEALS

1.5.1 INTRODUCTION

Aerial counts of ringed seals were conducted to estimate the number and determine the distribution of ringed seals in Lake Melville in the spring.

Previous aerial surveys to determine population levels were begun in May 1979 by Atlantic Biological Services Ltd. under contract to the Newfoundland Department of Development but these were terminated in their early stages due to government funding restraints.

1.5.2 METHODS

Aerial surveys of ringed seals were conducted in April and May 1982 using a Cessna 185 aircraft supplied by Newfoundland and Labrador Air Transport.

It should be noted that after April 25, surveys could only be conducted on Sundays to avoid disturbing the ringed seal hunt. Hunting is illegal by provincial statute on Sundays and the ringed seal hunting season is closed over most of the lake by Federal regulation until April 25 each year. The survey team therefore was somewhat limited in the days on which it could fly the surveys, considering that near ideal weather conditions were required for the surveys.

The surveys were flown at an altitude of 152 m (500 ft.) while attempting to maintain the aircraft airspeed at 210 km/h (130 mph). Two observers sat side by side in the rear of the aircraft, each observing a strip 425 m (1400 ft.) wide on their side of the aircraft. Strip width was controlled using predetermined marks on the struts of the aircraft.

The observers defined each seal observation as being "in" or "out" of the survey strip. The pilot watched for seals immediately ahead and passing under the aircraft, and kept the observers alerted of these seals for data recording purposes. Observations were logged by each observer onto cassette tape recorders. The data logged by the observers included the number and location of seals, the time in minutes and seconds as read from an electric chronometer, whether the seal dove down its hole or remained on top of the ice, plus other observations of interest.

The approximate location of each observation was later mapped by determining elapsed time and estimating the distance along predetermined flight lines. The flight lines (or transects) were 5 km (3 miles) apart and ran in a north-south orientation.

1.5.3 RESULTS

Aerial surveys were conducted or attempted on April 12 and 20 and May 9 and 23. The April 20 and May 9 surveys were terminated relatively early in their course due to factors such as rough flying conditions due to excessive wind and/or an apparent lack of seals hauled out. These incomplete surveys are not reported.

On April 12 surveys were begun at the south end of transect #1 at 1:45 p.m. and terminated at the north end of transect #21 at 4:20 p.m. A total of 483 km (299 miles) of transect were surveyed. Cloud cover varied between a trace to 6/10, the winds were north westerly and generally light and the temperature (at Goose Bay Airport) varied between -1.3°C and 3.0°C during the survey period. The lake ice was completely snow covered and no sign of melting was visible from the air.

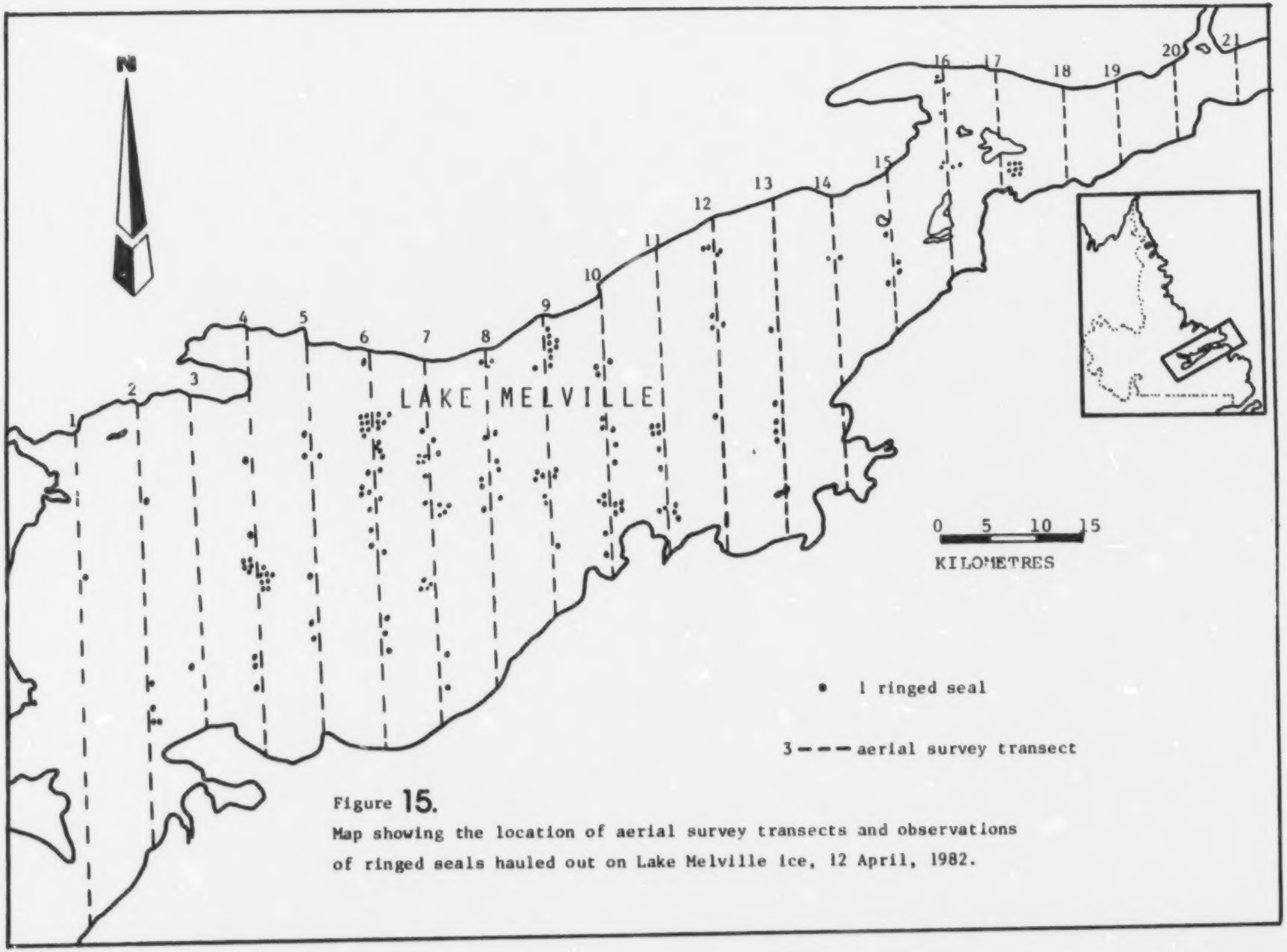
Table 3 lists the numbers of ringed seals observed during the survey. A total of 131 ringed seals were observed in the survey strips and 41 were observed outside the survey strips. Figure 15 shows the distribution of all seal observations made on April 12.

On May 23 surveys started at 3:10 p.m. at the south end of transect #2.

TABLE 3

Numbers and Observed Densities of Ringed Seals Observed During Aerial Surveys of Lake Melville on April 12, 1982.

Survey Line #	Line Length (km)	Right hand side of aircraft		Left hand side of aircraft		Observed density of seals/ km^2
		IN	OUT	IN	OUT	
1	44.75	1	0	0	0	0.026
2	37.5	1	0	2	3	0.094
3	27.75	0	0	0	0	0
4	34.75	10	0	7	1	0.575
5	32.75	1	0	4	1	0.179
6	33.5	15	0	11	3	0.913
7	30.5	5	3	9	2	0.540
8	25.75	5	1	2	3	0.31
9	25.0	5	1	6	5	0.518
10	25.25	6	3	5	3	0.513
11	25.25	1	2	4	4	0.233
12	28.25	4	1	3	0	0.292
13	28.5	0	0	3	2	0.124
14	27.0	1	1	1	0	0.087
15	13.5	2	0	2	0	0.349
16	17.25	4	2	3	0	0.409
17	9.5	8	0	0	0	0.991
18	7.5	0	0	0	0	0
19	8.0	0	0	0	0	0
20	6.5	0	0	0	0	0
21	4.25	0	0	0	0	0
TOTALS	493.0	69	14	62	27	
Mean						0.293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19
20
21
0 5 10 15
KILOMETRES
● 1 ringed seal
3 - - - aerial survey transect

Figure 15.
Map showing the location of aerial survey transects and observations of ringed seals hauled out on Lake Melville ice, 12 April, 1982.

Transects #1, #20, and #21 were not surveyed because the spring melt has progressed sufficiently that these transects were entirely open water. Surveys terminated at 5:49 p.m. at the south end of transect #19. A total of 437.5 km (272 miles) of transect were surveyed. Cloud cover was negligible, winds were moderate westerly, and the temperature at Goose Bay Airport varied between 5°C to 12°C during the survey period. The ice surface had undergone considerable melting, to the point where ringed seal whelping lairs were fully exposed and much of the surface snow and melt water had cleared off.

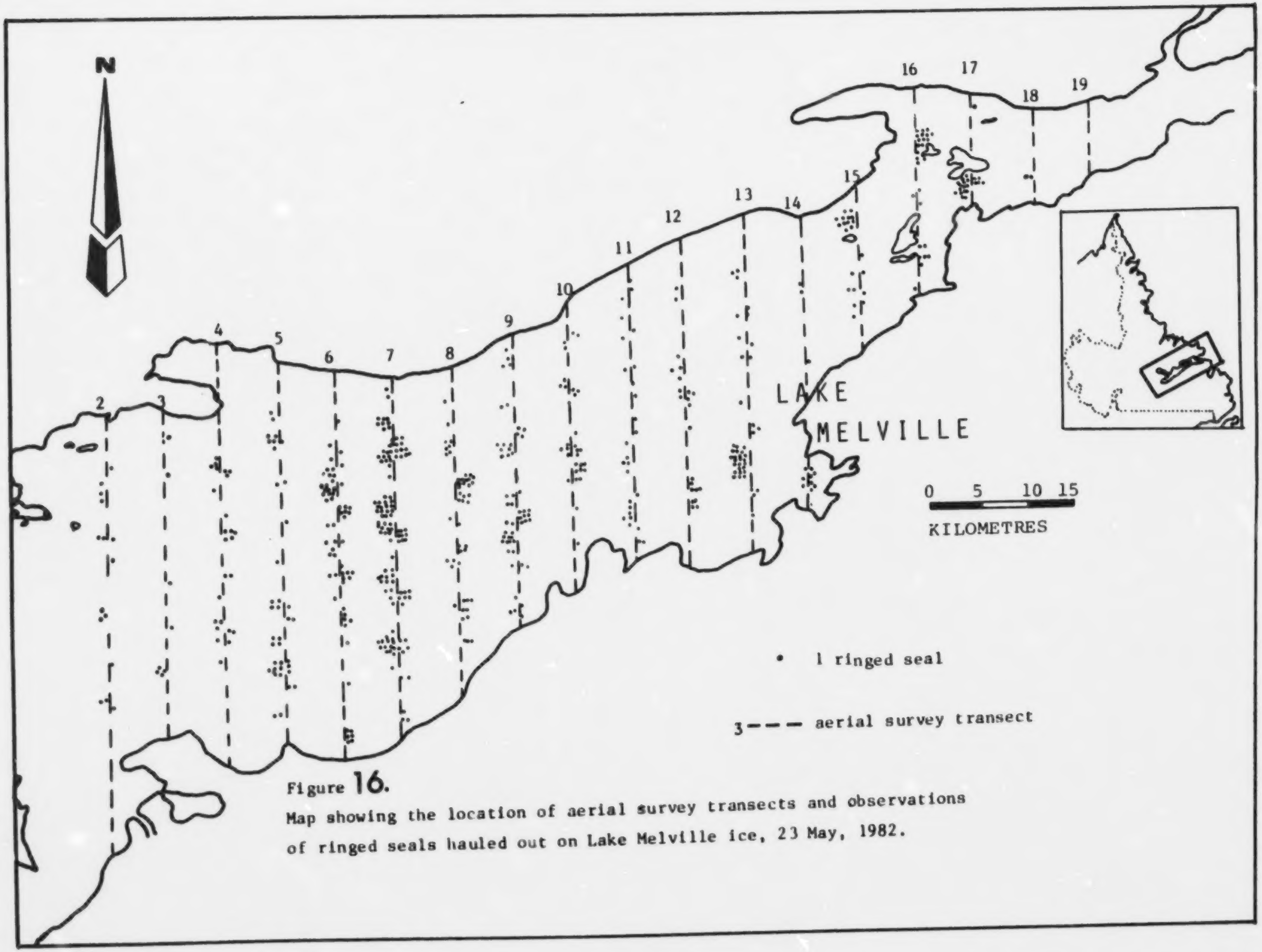
Table 4 lists the number of ringed seals observed during the survey. A total of 495 ringed seals were observed in the survey strips and 83 were counted outside of the survey strips. Figure 16 shows the distribution of the seal observations made on May 23.

TABLE 4

Numbers and Observed Densities of Ringed Seals Observed During Aerial Surveys of Lake Melville on May 23, 1982.

Survey Line #	Line Length (km)	Right hand side of aircraft		Left hand side of aircraft		Observed density of seals/ km^2
		IN	OUT	IN	OUT	
1	(deleted - all - open water)		-	-	-	-
2	37.5	3	2	10	*	0.408
3	27.75	4	0	4	*	0.034
4	43.75	13	1	10	*	0.078
5	32.75	27	1	13	*	1.438
6	33.5	27	1	30	*	1.65
7	30.5	57	26	38	*	3.66
8	25.75	21	16	13	*	1.553
9	25.0	22	13	19	*	1.929
10	25.25	12	8	8	*	0.932
11	25.25	11	5	11	*	1.025
12	28.25	13	0	8	*	0.875
13	28.5	31	0	12	*	1.775
14	27.0	9	0	2	*	0.479
15	13.5	15	3	4	*	1.656
16	17.25	25	0	2	*	1.842
17	9.5	14	1	8	*	2.726
18	7.5	2	0	0	*	0.314
19	8.0	0	0	0	*	0
20	(deleted - all - open water)		-	-	-	-
21	(deleted - all - open water)		-	-	-	-
TOTALS	437.5	303	83	192	-	-
Mean						1.243

* Not recorded


N
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17
18
19
LAKE MELVILLE
0 5 10 15
KILOMETRES
• 1 ringed seal
3 – – – aerial survey transect

Figure 16.
Map showing the location of aerial survey transects and observations of ringed seals hauled out on Lake Melville ice, 23 May, 1982.

1.5.4 DISCUSSION

Lake Melville became completely clear of ice on June 4 in 1982. For at least 10 days before this, extensive areas of open water developed at the east and west ends of the lake. The greatest number of seals hauled-out on the ice is reported, for arctic areas, to be just prior to break-up (McLaren 1958, Smith 1973a, 1973b). If the peak of the haul-out period follows a similar pattern in Lake Melville as in the arctic, then the May 23 survey was made at a time when close to the maximum number of ringed seals can be expected to be hauled-out on the ice, thereby providing the most accurate census data. There is also a diurnal cycle of ringed seals hauling out, with the greatest numbers being on the ice in the afternoon (Burns and Harbo, 1972, Smith, 1973b). Our surveys on April 26 and May 23 were conducted in the afternoon with this factor in mind.

Population estimates of ringed seals in Lake Melville can be calculated by applying the following general formula to the survey data collected when the maximum number of seals were observed and assumed to be hauled-out:

(mean observed density/sq. km.) (area of Lake Melville) (factor for seals under the ice at the moment of survey)

The surveyed area of Lake Melville, which excludes Goose Bay and the area west of Epinette Point (59°57' W), extends as far east as 58°40'W and is calculated to be 1,663 sq. km (642 sq. miles).

The factor for seals not counted because they were under the ice, and therefore unobservable, has been variously estimated by other researchers in other areas. Smith (1975) has used a 2X factor derived from the assumption that at the peak of the haul-out the number of ringed seals on top of the ice represents 50% of the population. Shustov (1969, cited in Fedoseev 1971) reported that 83-84% of ringed seals were on top of the ice during the peak of haul-out. Based on extended observations, Finley (1979) derived a proportion of 70% of the population visible during the peak of haul-out at a central Arctic location. For the purposes of this study, the proportion of 70% of the seals being on top of the ice and observable at the peak haul-out will be used in making population estimates.

The estimated ringed seal population (N) at a 95 percent confidence interval (C.I.) for Lake Melville is calculated as follows:

$$\text{C.I.} = 1.96\ [(\text{S.E.})^2\ (\text{area})^2]^{.5}$$

$$\begin{aligned} \text{N} &= (x)\ (\text{area})\ (\text{factor for seals under the ice}) \pm \text{C.I.} \\ &= (1.243)(1663)(1.42) \pm 1.96\ [(.51)^2(1663)^2]^{.5} \\ &= 2935 \pm 1662 \end{aligned}$$

Using the stated assumptions and the survey data at a 95% confidence level, the estimate was made that there were between 1,273 and 4,597 ringed seals in Lake Melville at the time of the May 23 survey.

Hunters believe the majority of ringed seals move out of Lake Melville for most of the months of open water. Some seals remain all year round. In the fall, prior to freeze up, they are reported to return in numbers to Lake Melville from Groswater Bay and other coastal areas. Whether or not there is a truly resident population of ringed seals in the lake is unknown. As well, there is no data on whether the returning seals in the fall are the same seals that left Lake Melville in the early summer.

The mean observed density of ringed seals in Lake Melville determined from 18 survey transects was 1.24/sq. km (3.2/sq. mile) (range 0-3.66/sq. km, 0- 9.5/sq. mile). Comparative densities for the Labrador coast and other selected regions are listed in Table 5. It can be seen that in the spring of 1982 Lake Melville ranked below average in observed density of ringed seals compared to the Labrador coast and some eastern Arctic regions in other years.

The general distribution of the seals in the lake is broad, however, there are two regions where they become relatively more numerous.

Figures 15, 16 and 17 show the greater numbers of ringed seals observed to be on survey transects 5 to 9 and 15 to 17 during both surveys. Transect #13 showed a substantially greater increase in density in late May than did most other transects. This correlates with the reports of hunters that hunting is better late in the season off Frenchman Point (south end of transect #13). A large cluster of seals was recorded just southeast of there during the May 23 survey and this shows up in Figure 17.

The apparent greater density of seals on transects 5-9 conforms only very roughly to the regions of Lake Melville where the water is generally less than 100 metres deep. This would include Nebavik and Mulligan Shoals and continue across the lake to Kinriakak Point. At the east end of the lake, the density and distribution of ringed seals does not appear to relate to water depth.

A comparison of the general 1982 spring distribution of seals with the ice conditions recorded during freeze-up (McLaren Plansearch, 1982, unpublished data) in late December 1981 showed no consistant pattern for the three areas with the relatively higher densities of seals.

TABLE 5

Selected Comparative Observed Mean Densities of Ringed Seals in Landfast Ice.

Location	Source	Observed Mean Density/sq.km
Labrador		
Lake Melville	This study	1.26
Northern Labrador	Boles et al (1980)	2.44
Central Labrador	Boles et al (1980)	1.51
Makkovik Region	Northland Assoc. Ltd.(1977)	1.6
N.E. Coast of Labrador	MacLaren Marex (1979)	1.05 ± 0.74
Ungava Bay	MacLaren Marex (1979)	0.47 ± 0.21
Baffin Island		
Home Bay	Smith (1973)	2.72*
Hoare Bay	Smith (1973)	2.01*
Cumberland Sound	Smith (1973)	1.54*
Pond Inlet	Koski and Davis (1979)	1.13
Pond Inlet	Koski and Davis (1979)	0.81
N.E. Baffin Island	Koski and Davis (1979)	1.65

* Density figures adapted from originally reported form for consistency of unit of measure and brevity.

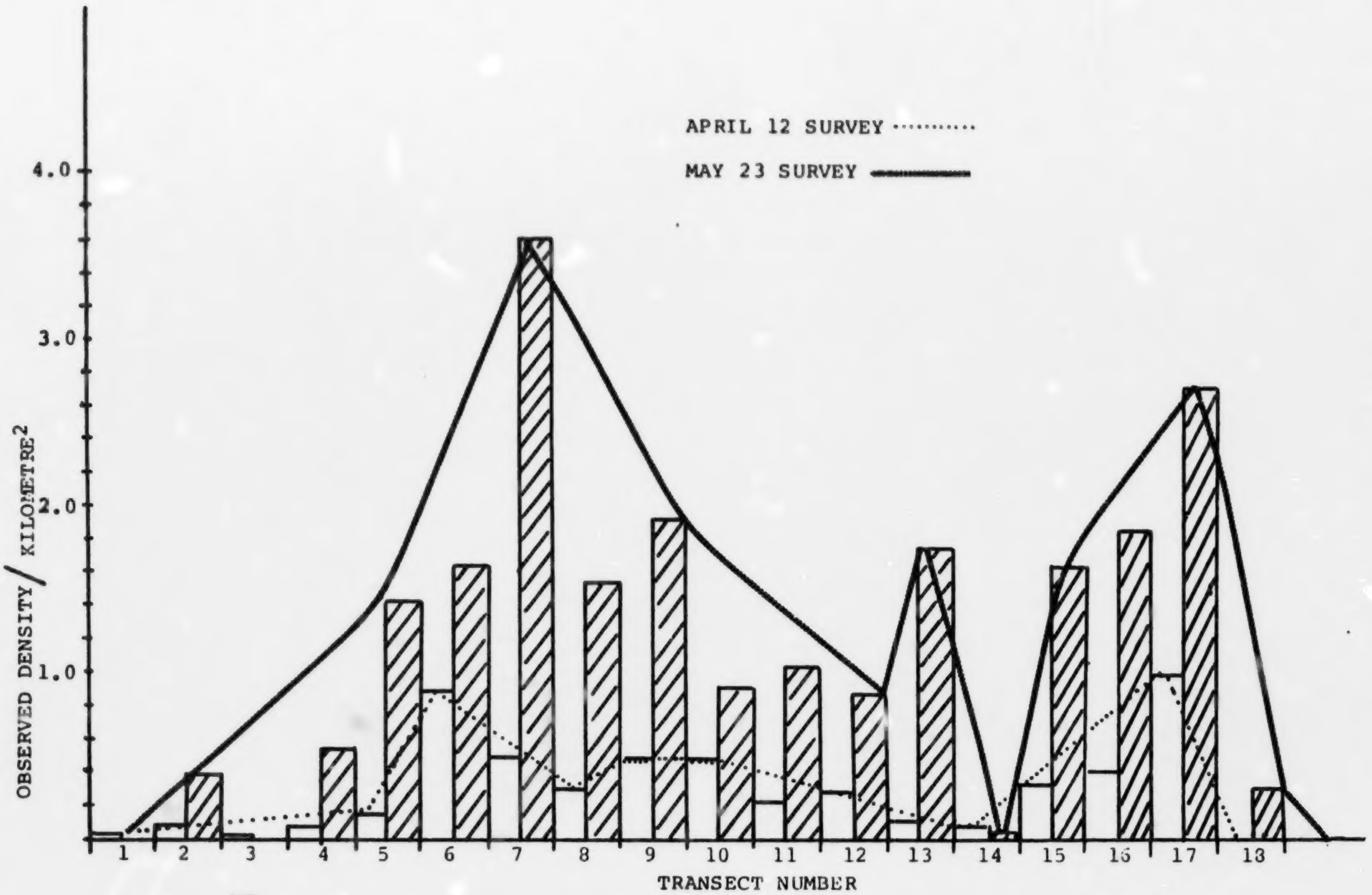


Figure 17. Graph showing the observed mean density of ringed seals on each transect during surveys on April 12 and May 23, 1982.

1.6 AERIAL COUNTS OF SEAL HUNTERS ON LAKE MELVILLE

1.6.1 INTRODUCTION

It was decided that an aerial census of hunting parties on Lake Melville would be a practical method of collecting some data which could be used as a guide in assessing, in part, the impact on spring seal hunting activities of an icebreaker travelling through Lake Melville.

1.6.2 METHODS

An aerial count of hunters was undertaken on April 26, the first day of open season for ringed seal hunting in Lake Melville. Four observers (including the pilot) in a Cessna 185 aircraft flew at an altitude of 365 m (1200 ft.) along predetermined flight lines which were spaced 10 km (6.2 miles) apart (Figure 18). The ice surface was scanned with the naked eye and binoculars. When hunting parties were located the number of snowmobiles present and their general location was recorded on a 1:250,000 scale map.

Surveys began at 1:30 p.m. and terminated at approximately 4:00 p.m.

1.6.3 RESULTS

Weather during the survey was clear and sunny, temperatures at Goose Bay Airport ranged from 6°C to 7°C. Visibility was excellent. The ice surface had undergone considerable melting, and the tracks of snowmobiles testified to the slushy surface conditions occurring in some parts of the lake. Hunters were lightly clad therefore it was assumed to be very mild at ice level.

A total of 37 snowmobiles were counted on the lake in 14 separate groups. Group size ranged from 1 to 11. The large group of 11 appeared to be a luncheon gathering of hunters. Excluding this unusually large group the mean size of the hunting parties was 2 snowmobiles each (see Table 6). Figure 18 shows the general location of the snowmobiles observed.

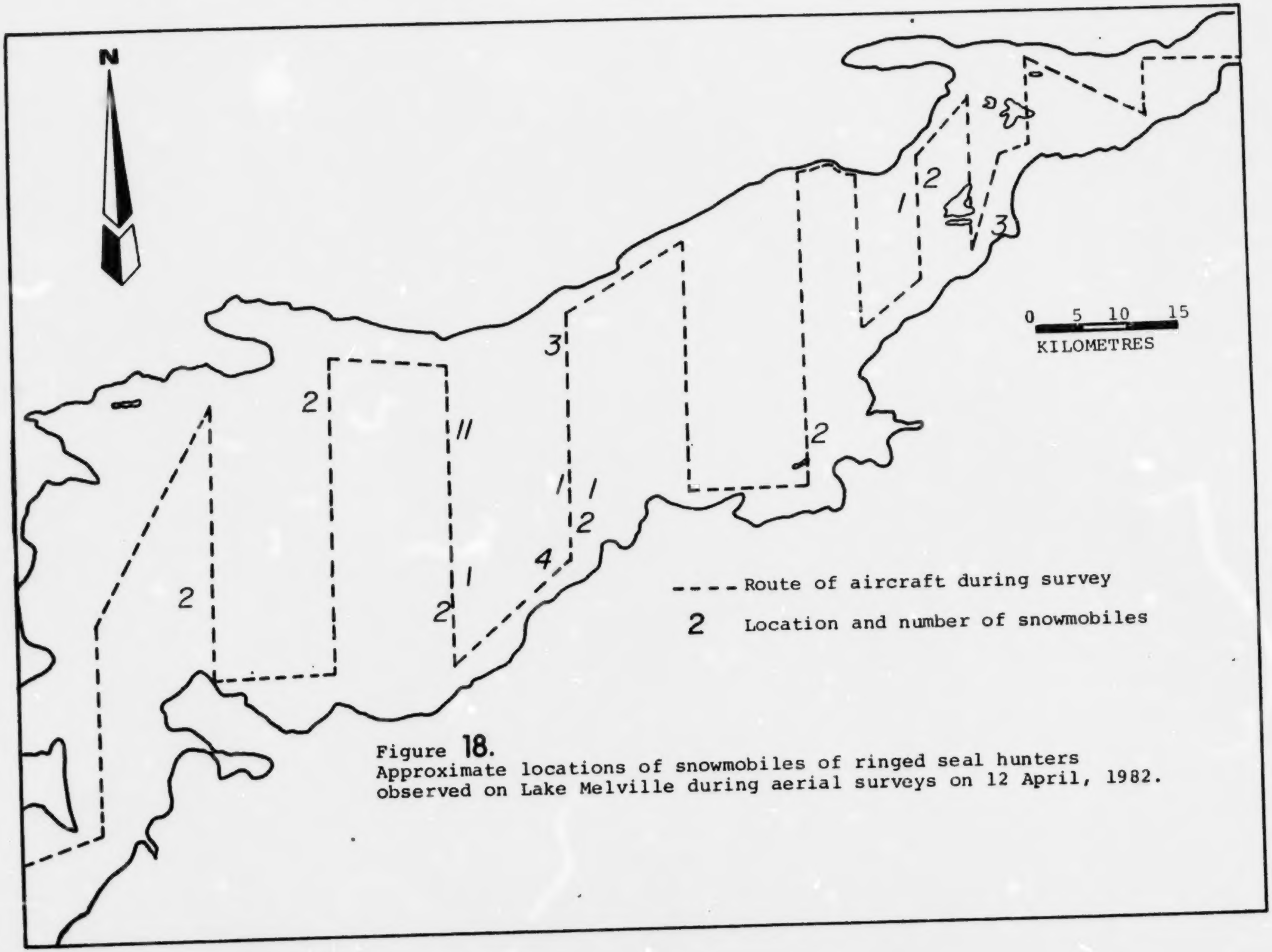

N
0 5 10 15
KILOMETRES
Route of aircraft during survey
2 Location and number of snowmobiles
2
2
11
3
1
1
2
4
1
2
2
2
1
3

Figure 18.
Approximate locations of snowmobiles of ringed seal hunters observed on Lake Melville during aerial surveys on 12 April, 1982.

TABLE 6

Aerial Survey Counts of Snowmobiles on Lake Melville on April 26, 1982, Which Were Thought to be Involved in the Ringed Seal Hunt.

	Group Size
	2
	2
	11
	2
	1
	4
	2
	1
	1
	3
	2
	1
	2
	3
Total	37

Mean 2.64

Median 2.0

1.6.4 DISCUSSION

Travel conditions on Lake Melville were reported to be quite difficult in late April and through May, 1982 and, based on comments of seal hunters, severely restricted the level of hunting effort. Many hunters decided early in the spring not to become involved in the hunt at all or they tried just once or twice before concluding that the wear and tear on equipment and the extreme effort necessary was not worth the hunt this year. The soft and watery conditions of the ice surface lasts for several days at most in a more normal year. In 1982 it extended over much of the spring season.

The number of snowmobiles observed probably represents between 37 and possibly 50 hunters, considering that in a minority of cases more than one hunter may be associated with one snowmobile.

Not surprisingly, the distribution of the hunters (Figure 18) coincides very closely with the distribution of the hauled-out seals (Figures 15 and 16).

PART II SEAL HARVESTING AND RELATED ACTIVITIES ON LAKE MELVILLE

2.1 INTRODUCTION

Seal hunting in Lake Melville involves hunters from four communities around the shores of the lake hunting four species of which two, ringed seals and harbour seals, are present in all seasons, while harp and grey seals are seasonal visitors from the open ocean. Of the four communities, Rigolet is the most dependant on the seal hunt, and harvests both a higher number of seals and a greater variety of seal species over a more extended period of the year. The hunt from communities in western Lake Melville - North West River, Happy Valley and Mud Lake - is focused chiefly on young ringed seals, available on the lake ice during a brief period each spring, and tends to be a largely recreational pursuit for many participants. Declining pelt values in recent years have hurt the viability of seal hunting as an economic activity, though this is partly offset by the value of the meat, a high proportion of which is eaten by the families and neighbours of hunters and some of which is sold.

There is a strong tradition of trapping and subsistence hunting in all four communities and residents range widely throughout the region in these pursuits. They use the frozen surface of rivers, bays and lakes, including Lake Melville, extensively in winter and spring for travel by snowmobile.

This section of the report will examine:

1) the nature of seal hunting, particularly the pursuit of ringed seals, in Lake Melville;

2) the actual and anticipated impact of icebreaker traffic on the seal hunt and related activities on the ice surface of Lake Melville.

2.2 METHODS

2.2.1 HOUSEHOLD SURVEYS IN NORTH WEST RIVER AND RIGOLET

Questionnaires (Appendix B) were administered in 40 households in Rigolet in the last two weeks of March, 1982. These households were selected, on the basis of local advice, as those containing active seal hunters who would be willing to participate in this survey. Two more hunters, who were away when the initial survey was done, asked to be included when they returned to Rigolet in April. The 42 households include 51 hunters. This represents virtually all the seal-hunters and 65% of the households in the community.

Results from these questionnaires were placed on edge-punched cards which offered a simple method for retrieving selected sets of data (see Appendices C and D).

2.2.2 HARVEST DATA FROM THE SPRING HUNT

Active hunters in Rigolet were asked to participate in a regular tally of their success in the spring hunt. Forms (Appendix E) were distributed and collected every two weeks, beginning March 22, 1982, in an attempt to collect a full record of the hunt, including the proportion of young, juvenile and mature seals taken, areas hunted, the proportion of meat used as food and the hunting methods employed.

Again, data from this survey was placed on edge-punched cards for analysis (data is tabulated in Appendices F, G and H).

2.2.3 FIELD VISITS AND INTERVIEWS

Informal interviews were conducted during visits to Rigolet February 10-12 and June 10-12, that is, before and after the spring hunt. Similar interviews were conducted in North West River and Happy Valley in October. In all cases, the men interviewed were those identified by local sources as reliable and experienced hunters. In this portion of the research, as well as in household surveys and the collection of weekly harvest data, Rigolet got more attention than North West River, which in turn got more attention than Happy Valley, because of the relative importance of the seal hunt in these communities.

A snowmobile survey of hunting camps around the shores of Lake Melville, including a round of interviews, photographs and observation of the seal hunt, was planned for mid-April, but had to be cancelled because of unusually severe travelling conditions and a back injury to one of the researchers.

2.2.4 ANALYSIS OF SEAL PELT SHIPMENTS

The Hudson's Bay Company stores in Rigolet and North West River gave researchers access to their records of seal pelts purchased and shipped, including prices paid for pelts. In Rigolet, data was made available from June, 1977, to August, 1982; in North West River, from September, 1979, to August, 1982. This data permitted a cross-check on the hunters' own estimates of the levels of harvest for various species in recent years.

2.3 RESULTS AND DISCUSSION - THE NATURE OF THE SEAL HUNT IN LAKE MELVILLE

2.3.1 SPECIES TAKEN

Ringed seals, known locally as "jars", make up the bulk of the harvest, particularly in the western end of the lake. Based on Hudson's Bay records, the harvest has varied between 400 and 900 in recent years. Harp seals migrating south along the Labrador coast come into Lake Melville in December, and again in spring and early summer on their way north after whelping on pack ice in the Labrador Sea and the Gulf of St. Lawrence. In recent years, the harvest of harp seals has been around 200, but it can rise much higher on very rare occasions when favourable winds drive a patch of whelping seals into Groswater Bay, as happened in 1981. This was the first such occurrence in living memory. Harbour seals, known locally as "rangers" and "doters", are resident in Lake Melville in moderate numbers and are taken chiefly during seasons of open water. Grey seals are the fourth species taken, and are relatively rare.

Figures 19 and 20 illustrate the number and value of various seal species bought by the Hudson's Bay Company at Rigolet and North West River in recent years. The data from which these graphs were drawn is presented in Appendix I.

The prominence of ringed seals in the total picture can be seen in the fact that only in 1981, under highly exceptional conditions, was the kill of harp seals more than a third the number or half of the value of the ringed seals taken. The exception, however, is even more remarkable than the graph indicates, because a roughly equal number of harp seal pelts were sold that year to one of the offshore sealing vessels. With this exception, virtually all sales of seal pelts go through the Hudson's Bay Company.

2.3.2 HUNTING AREAS

The spring seal hunt in Lake Melville involves chiefly the killing of young ringed seals on the ice near whelping dens, after they have moulted their birth hair (lanugo) and left parental care. It is thus most concentrated near the areas favoured for whelping. For Rigolet hunters, the spring hunt takes them to the area of the islands at the eastern end of the lake, and westward beyond Green Island to the broad expanse of Lake Melville and to the Lowlands area on the north shore and Big Bight, or Etagaulet Bay, on the south shore. Areas used for netting seals are somewhat closer to Rigolet, among the islands and the approaches to The Backway, known locally as Back Bay. A significant portion of the Rigolet ringed seal harvest also comes from Groswater Bay, to the east of Rigolet Narrows.

Hunting areas for men from the upper Lake Melville communities are naturally closer to the western end of the lake, though there is some overlap with Rigolet hunters in the Lowlands and Big Bight areas.

A breakdown of the sources of seals killed by Rigolet hunters in

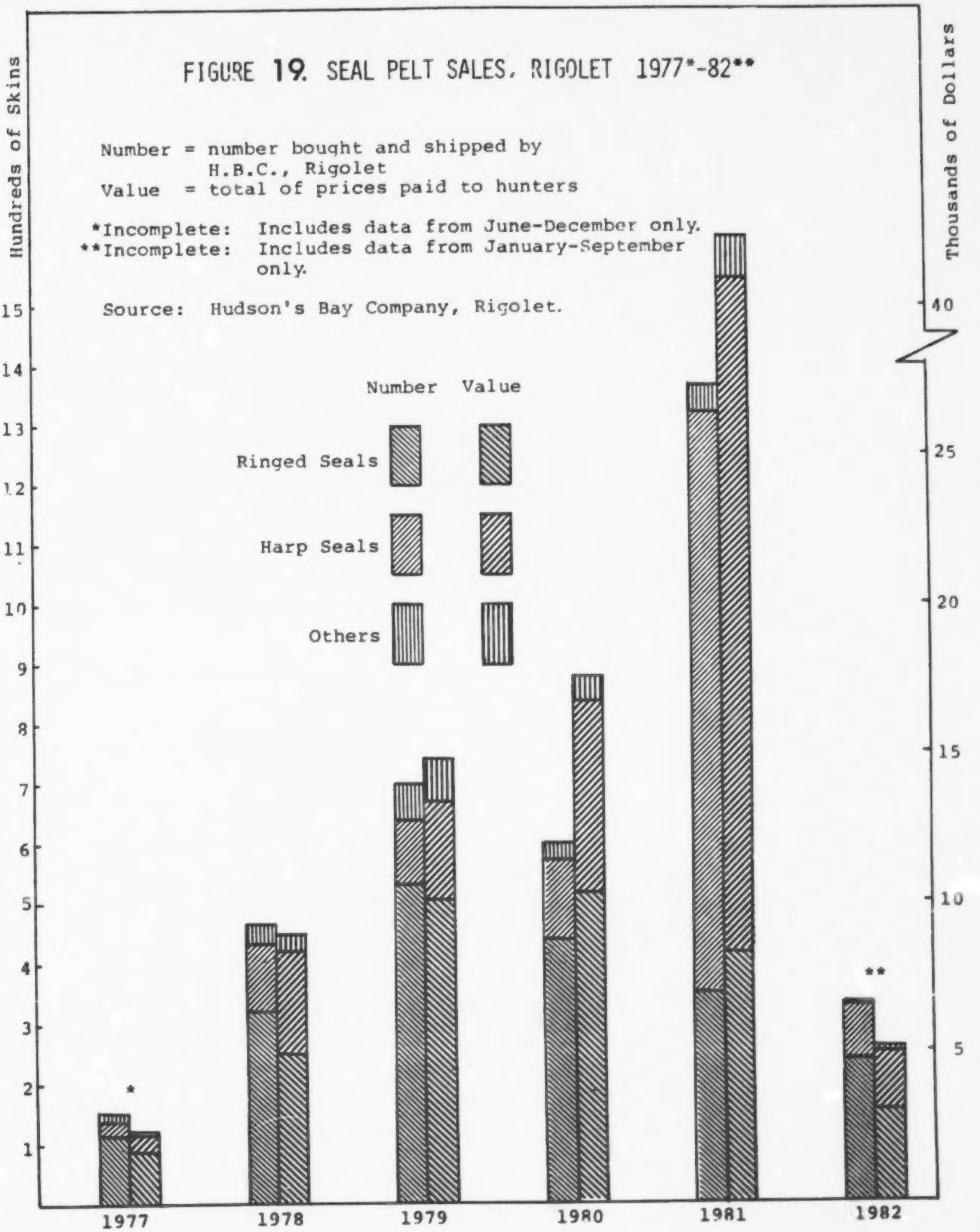


FIGURE 19. SEAL PELT SALES, RIGOLET 1977*-82**

Number = number bought and shipped by H.B.C., Rigolet
Value = total of prices paid to hunters

*Incomplete: Includes data from June-December only.
**Incomplete: Includes data from January-September only.

Source: Hudson's Bay Company, Rigolet.

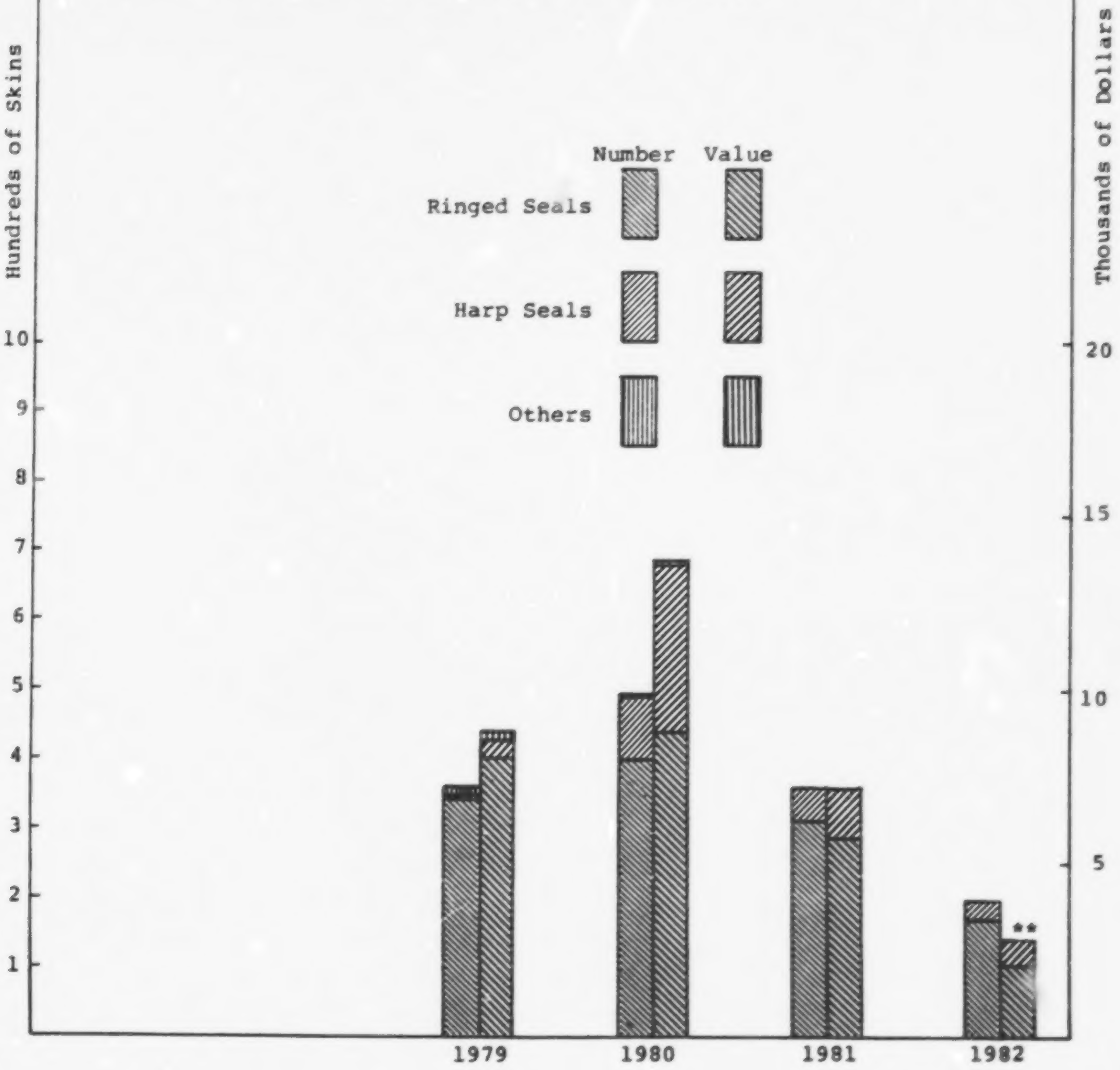
FIGURE 20. SEAL PELT SALES, NORTH WEST RIVER, 1979-82.*

Number = number bought and shipped by H.B.C., North West River.
Value = total paid to hunters.

*1982 data is from January to August only.

**includes 12 harp seal skins spoiled by poor handling.

Source: Hudson's Bay Company, North West River.



spring, 1982, is shown in Figure 21. However, poor travel conditions made 1982 an exceptionally poor seal hunting year, and it is not certain if the proportions harvested in various areas this year would hold true in other, more normal seasons.

2.3.3 HUNTING METHODS

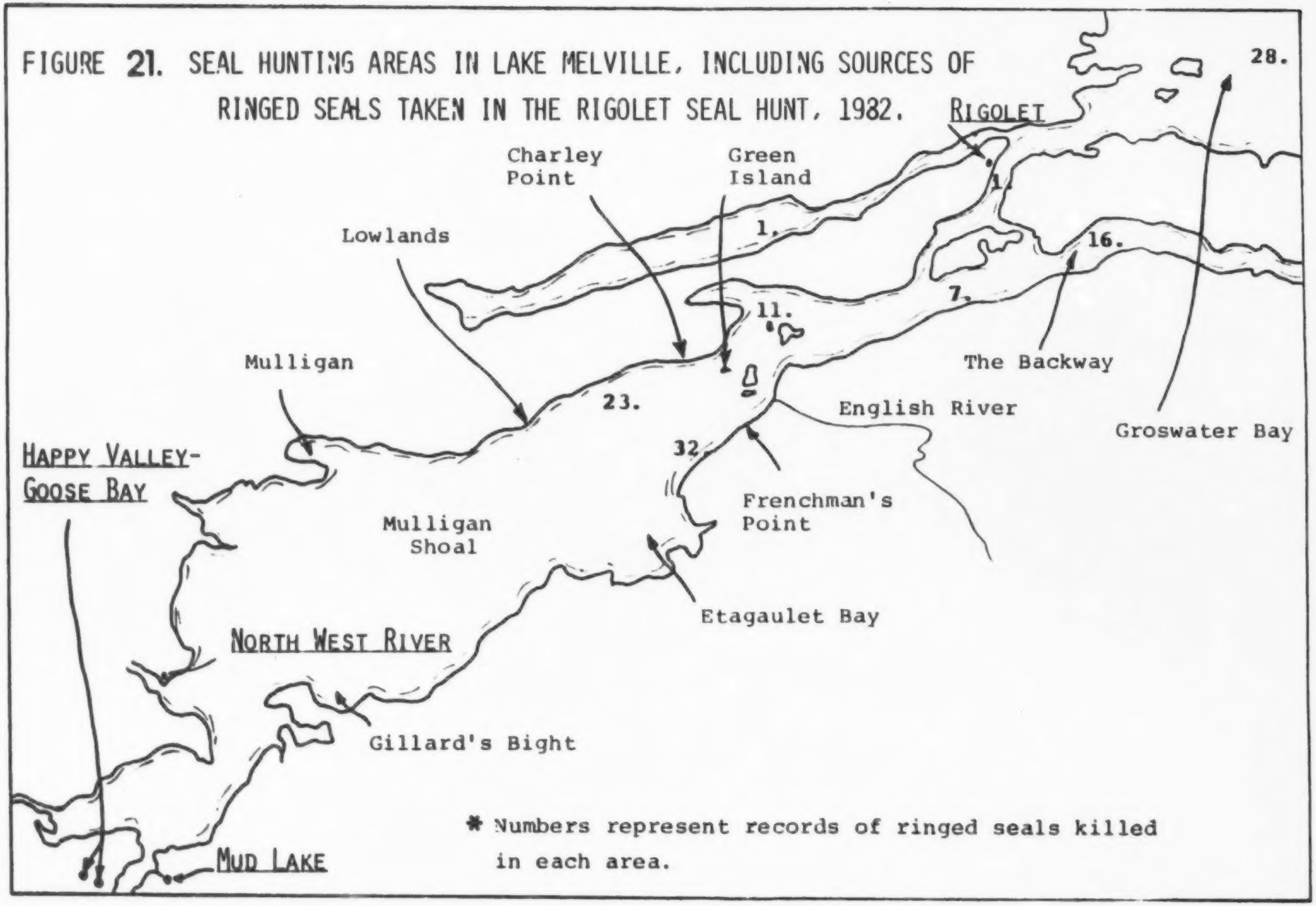
Seal hunting methods used on Lake Melville include catching seals in nets, shooting them with rifles on the ice or in the water, and spearing them with harpoons or "darts" as they rise in breathing holes in the ice. Because the methods used and the proportion of various species and age groups taken are very closely related, both will be examined together in this section.

The club used on harp seal pups at the Front is not normally employed in Lake Melville, though Rigolet hunters did club a high proportion of the whitecoats they took from those harp seals which drifted into the area in 1981. The same method does not work with ringed seals. Their pelts are worth very little as newborns, and they are normally hidden in their birth lairs at that age anyway. By the time the roofs of the birth lairs have melted off, and the young ringed seals have shed their white fur for a glossy silver and black jacket, the pups are too wary to approach and are quite capable of escaping into the water.

Figure 22 represents a breakdown of the number of ringed seals killed by various methods from September 1980 to September 1981, and Figures 23 and 24 show the proportion of young, juvenile and older jars killed during that year and the preceding year. The figures represent the hunters' own recollections of their kill during those periods, as well as their judgement of the seals ages. There is not much doubt about "young" when the seals in question are clearly young of the year. The animals described in this report as "juveniles" are those which hunters class as "pullamers" and are thought to be immature, non-breeding ringed seals.

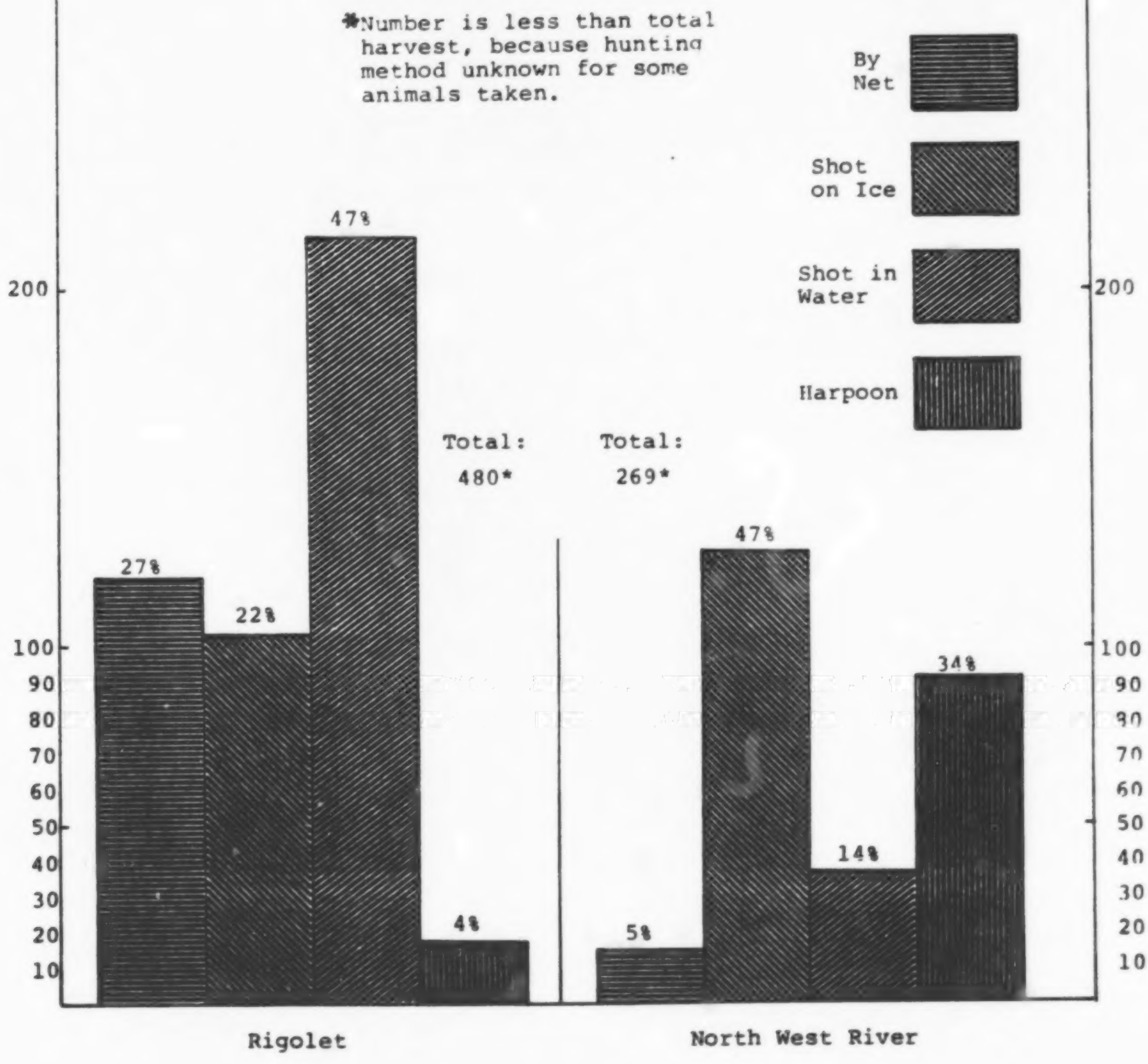
A simple comparison of hunters' harvest estimates with the number of pelts bought by the Hudson's Bay Company in each community is misleading

FIGURE 21. SEAL HUNTING AREAS IN LAKE MELVILLE, INCLUDING SOURCES OF RINGED SEALS TAKEN IN THE RIGOLET SEAL HUNT, 1982.


RIGOLET
28.
Charley Point
Green Island
1.
1.
16.
Lowlands
11.
7.
The Backway
Mulligan
23.
English River
Groswater Bay
32
HAPPY VALLEY-GOOSE BAY
Frenchman's Point
Mulligan Shoal
Etagaulet Bay
NORTH WEST RIVER
Gillard's Bight
MUD LAKE

* Numbers represent records of ringed seals killed in each area.

FIGURE 22. HUNTING METHODS FOR RINGED SEALS TAKEN
FROM SEPT., 1980 TO SEPT. 1981
AT RIGOLET AND NORTH WEST RIVER.



*Number is less than total harvest, because hunting method unknown for some animals taken.

FIGURE 23. RINGED SEALS TAKEN FROM SEPT., 1979, TO SEPT., 1980 AT RIGOLET AND NORTH WEST RIVER.

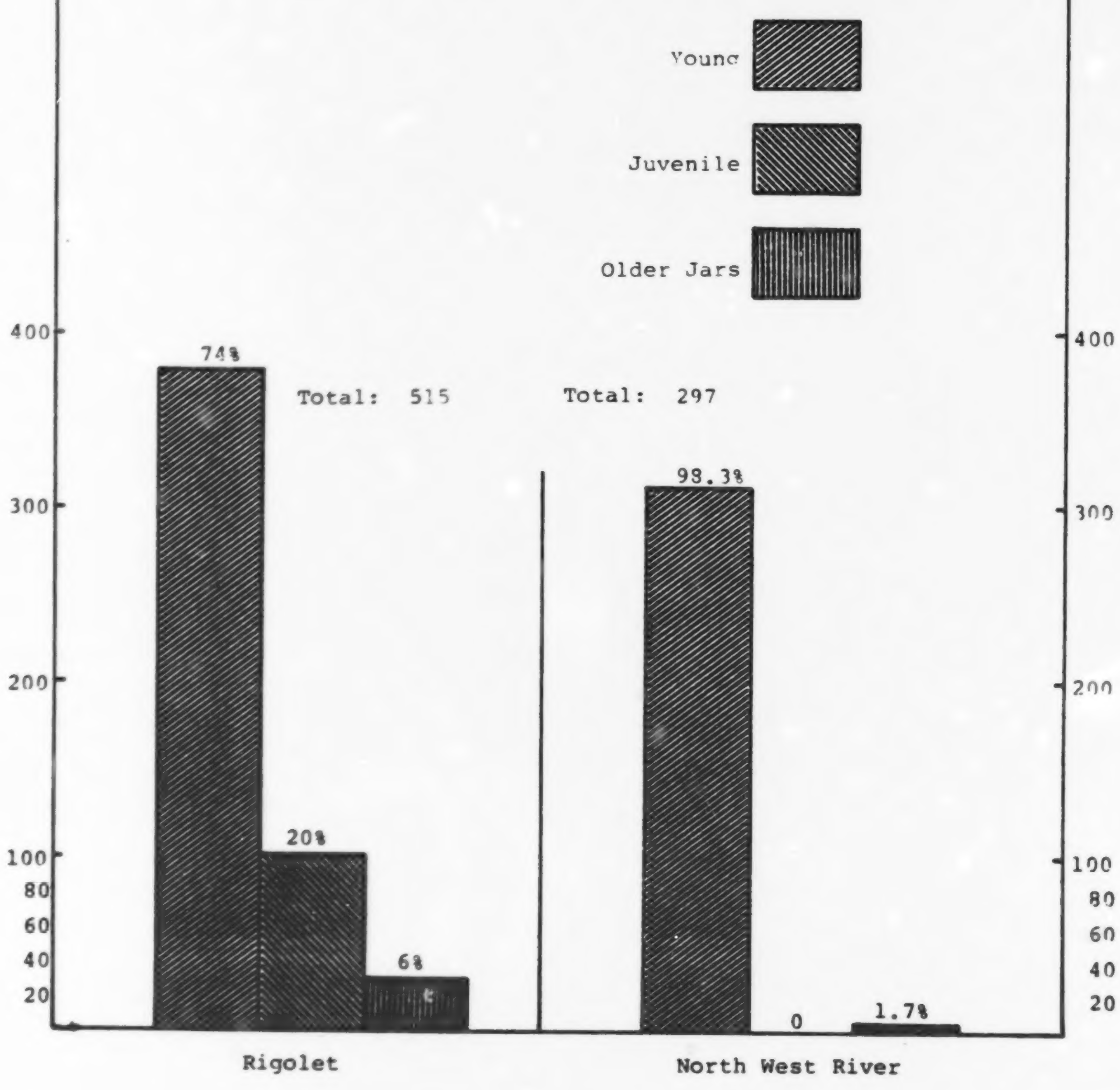
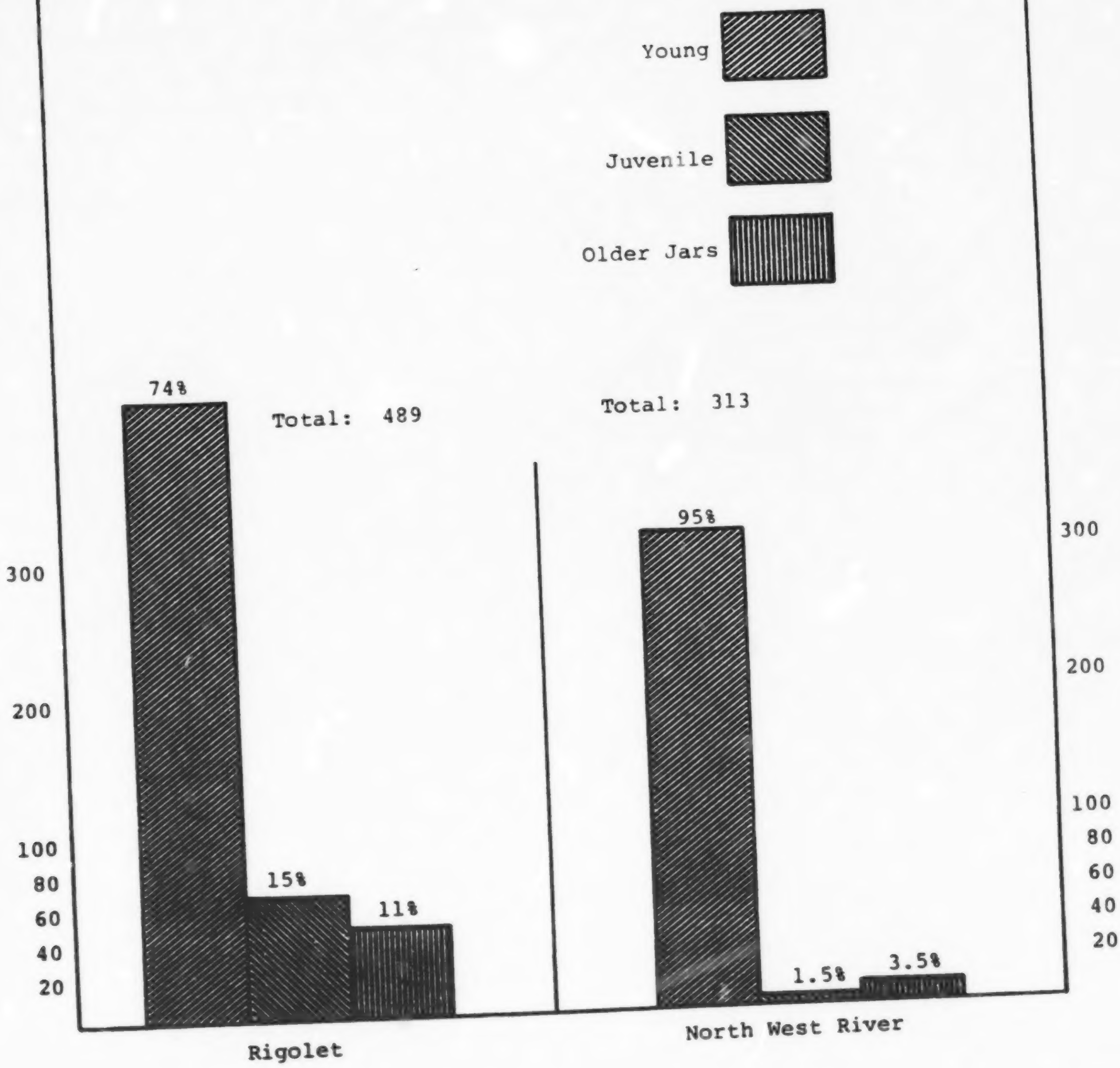


FIGURE 24. RINGED SEALS TAKEN FROM SEPT., 1980 TO SEPT., 1981 AT RIGOLET AND NORTH WEST RIVER.



on several counts. In North West River, a significant but unknown portion of the Bay's pelts are supplied by hunters from Happy Valley and Mud Lake. In both North West River and Rigolet, a substantial number of pelts are kept for handicrafts - skin boots, mitts and other items for family use or sale. When pelt prices are low, there is greater incentive to keep skins for this purpose. An unknown but probably small number are shipped to markets outside.

As Figure 22 shows, the reliance on various hunting methods differs widely between communities around Lake Melville. For example, darting accounted for about a third of the ringed seals taken by hunters in North West River, but only 4% of those taken by hunters in Rigolet. Similarly, nearly half the ringed seals taken by Rigolet hunters were shot in the water whereas only 14% of the North West River harvest was taken this way. To a large extent these variations reflect the different nature of the hunt at the two ends of the lake. The hunting effort in western Lake Melville is largely concentrated on the spring ice, with methods appropriate to that environment, while seal hunting out of Rigolet, though most intense in spring, continues at a lesser pace all year.

2.3.3.1 NETTING

In the year examined in Figure 22, more than a quarter of the ringed seals taken by Rigolet hunters were caught in nets. This method is used in all seasons except summer, when most hunters from Rigolet are busy salmon fishing. However, fewer than half the seal hunters of Rigolet regularly use nets for seals.

In winter, seal nets are set through cracks in the ice or through holes chopped for that purpose. Early in winter, when the ice thickness is growing rapidly and slob ice gathers under the surface, there is some danger of nets freezing into the ice, so that nets must be hauled frequently. Later in the season when the ice approaches its maximum thickness and is covered by a quilt of snow, nets need not be checked so often. As the ice breaks up in spring, nets are taken up or moved to deeper water, to avoid damage from drifting ice. All are out of the water by the time the salmon fishing season starts in late June, but may be set again in the period from September to freeze-up. Figure 25 shows the areas used for netting seals.

Nets are not widely used for ringed seals by hunters in western Lake Melville, but they are used for catching harps. Most of the harp seals taken by men from North West River in spring are caught in nets, set out after break-up especially for that purpose.

2.3.3.2 SHOOTING ON ICE

This technique exploits the ringed seals' habit of hauling out to moult and bask and doze on the ice surface in the spring. Hunters must stalk within shooting range, often taking advantage of hummocks in the ice or creeping up behind a hand-held square of white canvas. The seals, especially wary adults, will slip quickly down their holes at the first hint of danger.

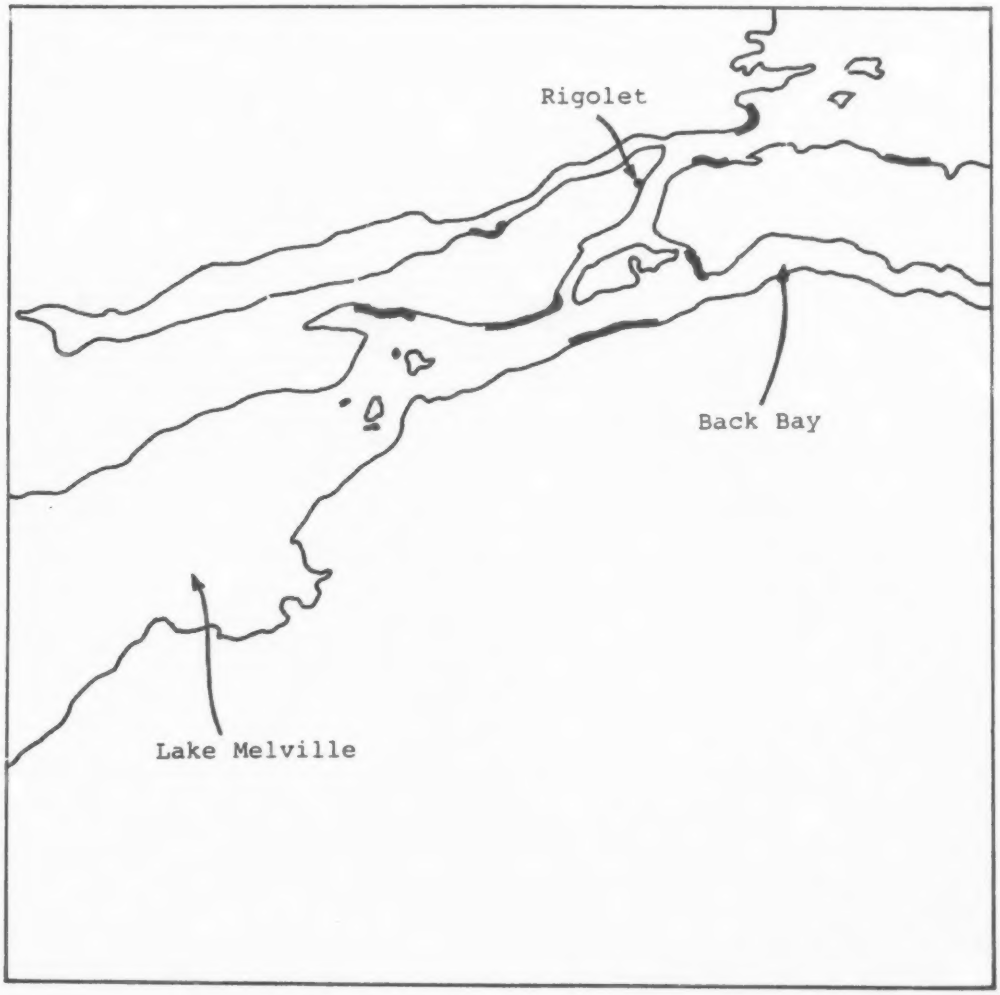
Hunters aim for the head, both to assure a clean kill and to avoid undue damage to the pelt. An injured seal will plunge through the hole and escape.

Many hunters prefer small calibre rifles, but regulations dictate minimum calibre and muzzle velocity. One problem with the more powerful rifles, apart from the high cost of ammunition, is that if you shoot the head of a seal looking toward you, the bullet will tear through the neck and body, leaving an exit wound on its way out that lowers the value of the pelt. A smaller calibre bullet leaves only a small entry hole. Some of the more serious hunters in Rigolet believe the regulations regarding rifles used in the seal hunt are intended for careless sports hunters and poor shots, who don't care where they hit.

Because of the ability of injured seals to slip down their holes in the ice, hunters must stalk close enough for a sure kill. This is increasingly difficult, as seals have become more wary. Many hunters spoke of this problem, and attribute it to greater traffic by

FIGURE 25. RINGED SEAL NETTING AREAS, RIGOLET.

Source: "Our Footprints are Everywhere"
and local interviews.


Rigolet
Back Bay
Lake Melville

snowmobiles, the noise of which keeps the seals on edge. One hunter said he used to be able to drive his snowmobile within shooting distance, even with mature seals, but now even the young ones are shy. Hunters must stalk as much as a mile, and risk the seal ducking down at the last moment if another hunter drives by.

2.3.3.3 HARPOONS

The extensive use of the dart by hunters from upper Lake Melville appears to be partly a result of the increasing wariness of seals. The heavier snowmobile traffic at the western end of the lake, particularly during the opening week or on weekends, makes stalking seals much more difficult.

But even the wariest seal must breathe, and in most cases must rise in one of a limited number of breathing holes for that purpose. If a group of men post themselves with darts at all or most of the breathing holes a seal has been using, their chances of taking that seal are good.

2.3.3.4 SHOOTING IN THE WATER

Figure 22 illustrates some of the key differences between seal hunting in Rigolet and upper Lake Melville. In North West River, more than 80% of the ringed seals are taken from the ice, either by rifle or harpoon. In Rigolet, nearly half are shot in the water.

The high proportion of seals harpooned or shot on the ice by hunters from North West River reflects the fact that their pursuit of ringed seals is confined almost entirely to the brief season when young of the year are readily available to them. This is confirmed by Figures 23 and 24, which show an overwhelming proportion of young seals in the harvest from North West River.

In Rigolet, on the other hand, while young seals made up three-quarters of the total harvest of ringed seals during the years in question, nearly half of all ringed seals taken were shot in the water.

This is a reflection of two facts which have a bearing on the importance of seals in the Rigolet economy. Because of strong tidal currents through a narrow channel, Rigolet faces open water year-round and has access to the open water of Groswater Bay when Lake Melville itself is covered by landfast ice. Partly as a result, Rigolet hunters take seals at almost any season, though spring is by far the most productive time.

2.3.3.5 THE SPRING HUNT, RIGOLET 1982

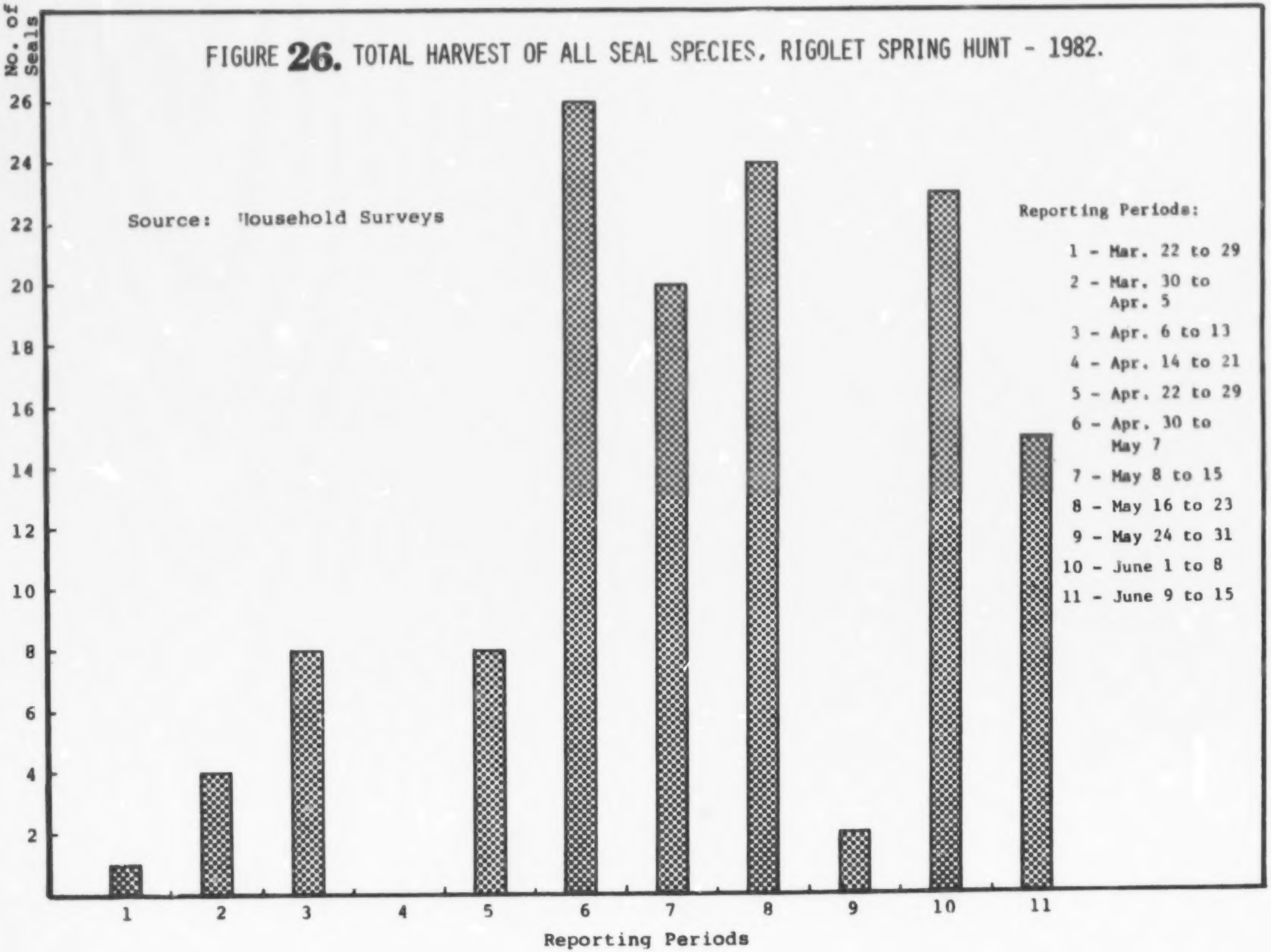
A more detailed look at the role of various hunting methods is offered in Figures 26 to 29 which chart the hunt in Rigolet in the spring of 1982. This was an exceptionally bad year, both in terms of weather and ice conditions, so that the numbers shown are not typical. However, the proportions killed by various methods, and the proportion of young, juvenile and mature ringed seals in the total, are probably in line with the numbers for more normal years.

As Figure 24 shows, these proportions change markedly over the course of the season, with juvenile animals predominating in the early weeks. The juveniles, known locally as "pullamers", apparently tend to stay nearer the islands at the eastern end of the lake, where open water makes them accessible to hunters with rifles. By the fifth week of the period surveyed, the week beginning April 22, hunters attention shifted to young seals on the ice farther west. For the next four weeks, young seals shot on the ice make up the bulk of the harvest.

The harvest dropped off very sharply in late May, when the ice suddenly became too rotten for safe travel. There followed a few weeks of hunting in the water. This is apparently a common pattern; as the ice breaks up in Lake Melville it normally drifts eastward and many seals move with it. As a result, there is often a period of good hunting in the water when ice gathers in the eastern part of the lake or in Back Bay.

This was the only period during the 1982 spring hunt when mature ringed seals made the greater part of the catch. One reason for the lower proportion of adults earlier in the season is that the adults are

FIGURE **26.** TOTAL HARVEST OF ALL SEAL SPECIES, RIGOLET SPRING HUNT - 1982.

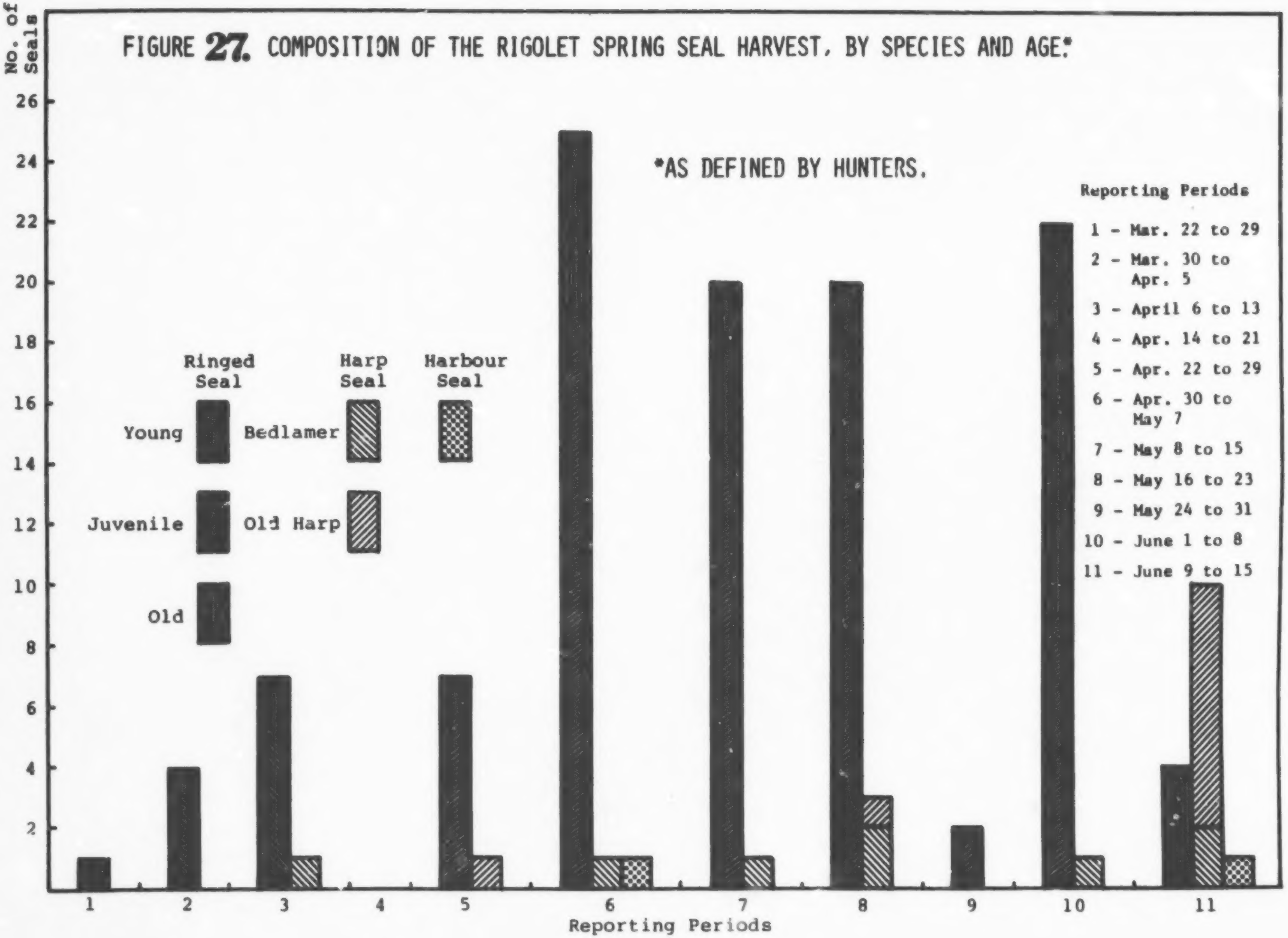


Source: Household Surveys

Reporting Periods:

1 - Mar. 22 to 29
2 - Mar. 30 to Apr. 5
3 - Apr. 6 to 13
4 - Apr. 14 to 21
5 - Apr. 22 to 29
6 - Apr. 30 to May 7
7 - May 8 to 15
8 - May 16 to 23
9 - May 24 to 31
10 - June 1 to 8
11 - June 9 to 15

FIGURE 27. COMPOSITION OF THE RIGOLET SPRING SEAL HARVEST, BY SPECIES AND AGE.*



*AS DEFINED BY HUNTERS.

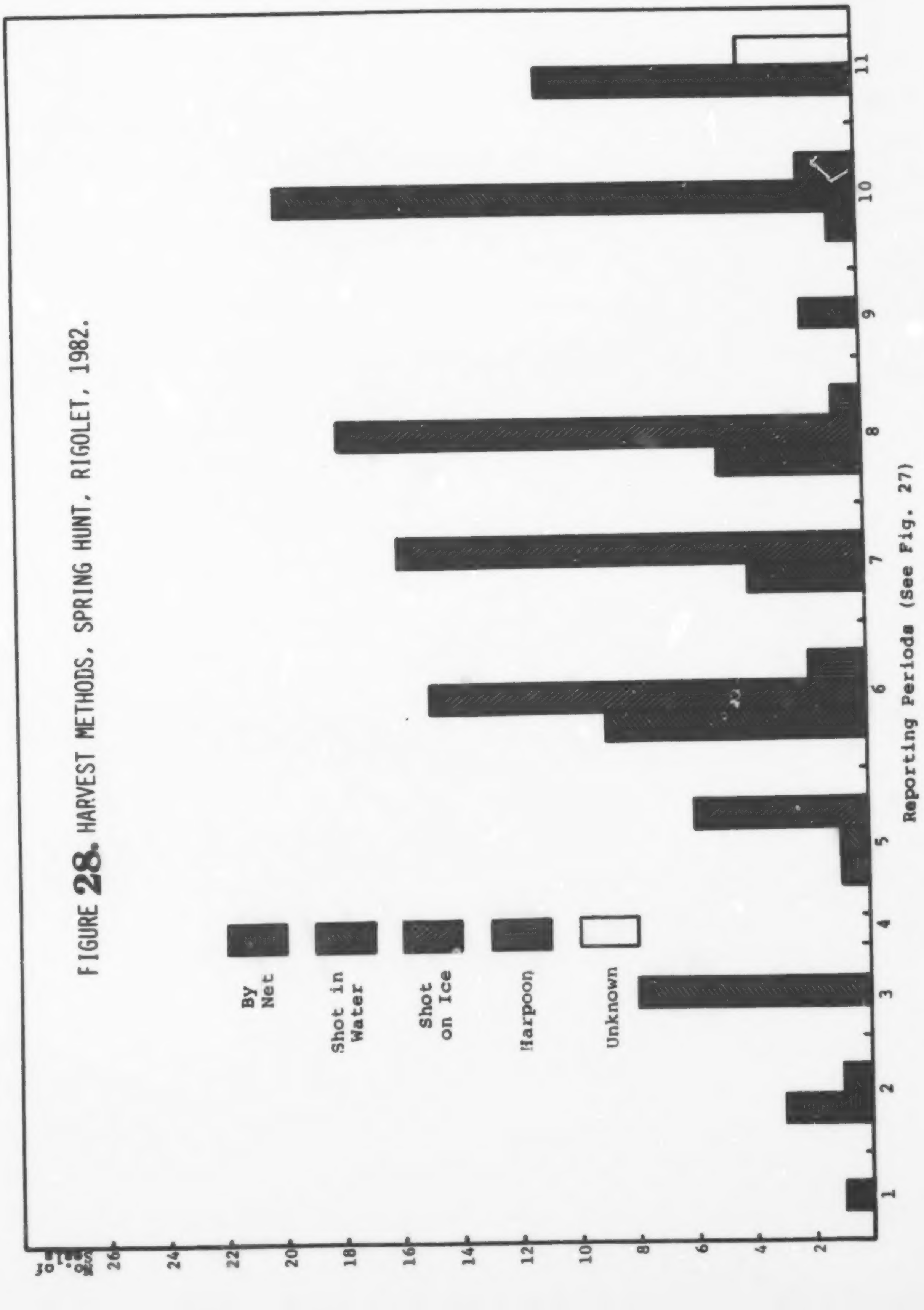
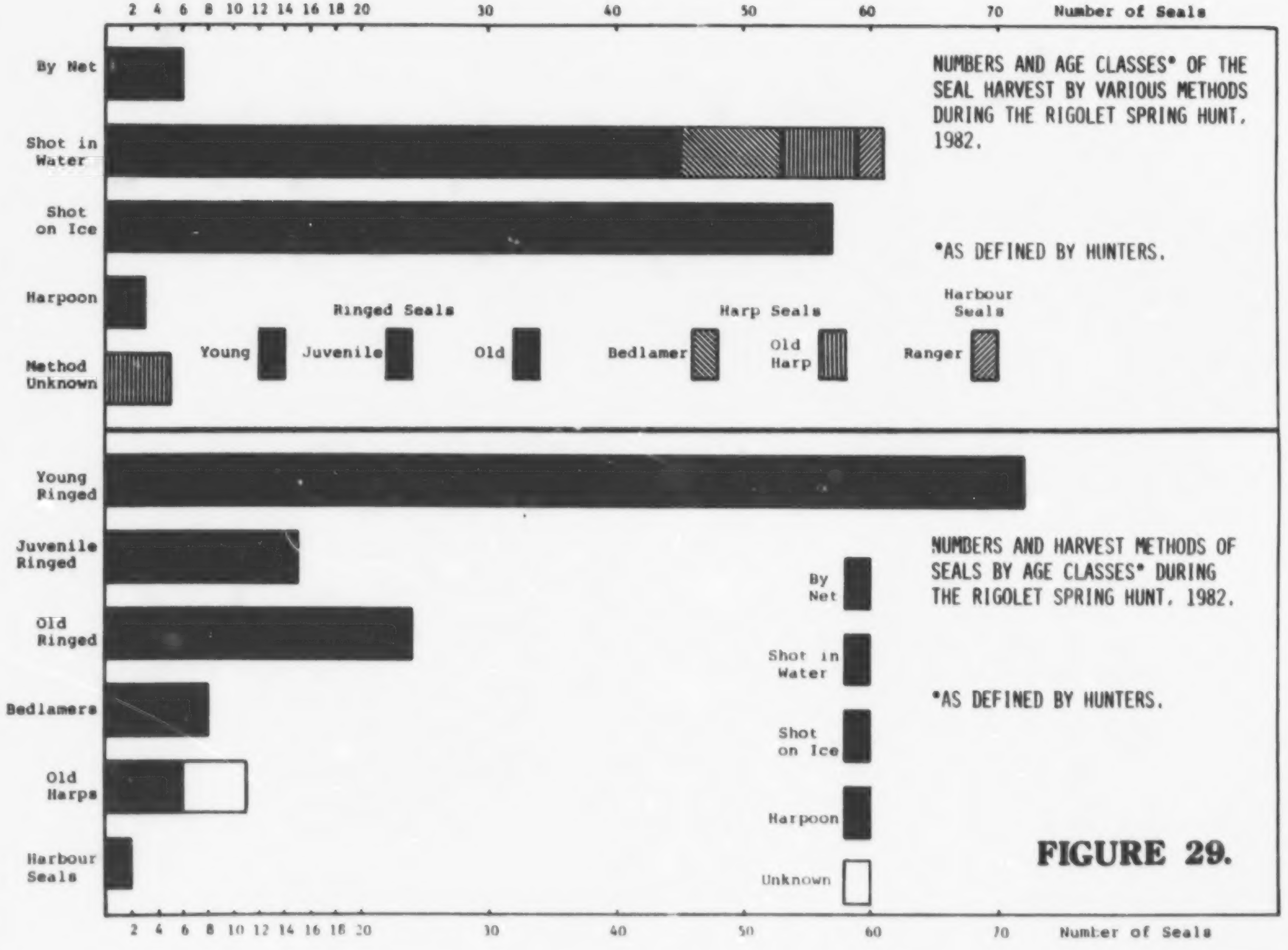


FIGURE 28. HARVEST METHODS, SPRING HUNT, RIGOLET, 1982.



NUMBERS AND AGE CLASSES* OF THE SEAL HARVEST BY VARIOUS METHODS DURING THE RIGOLET SPRING HUNT, 1982.

*AS DEFINED BY HUNTERS.

NUMBERS AND HARVEST METHODS OF SEALS BY AGE CLASSES* DURING THE RIGOLET SPRING HUNT, 1982.

*AS DEFINED BY HUNTERS.

FIGURE 29.

shedding at about the time the young-of-the-year are prime, so that hunters tend to leave them alone. Another is that adults are more wary when basking on the ice, and therefore less vulnerable than the young. In the water, however, they are equally vulnerable and offer a larger target.

Harp seals were a minor factor but were present throughout most of the spring hunting period. After the beginning of April, harp seals were taken in every week but two, both of which were periods of very bad weather. However, only in the final week, when the catch of ringed seals fell off sharply, were harp seals the dominant share of the harvest. Of the 19 harp and bedlamer (juvenile harps) seals taken, at least 14 were shot in the water. The hunting method was not recorded for the other five, but four of these were taken in the second week of June and were almost certainly shot in the water as well.

2.3.3.6 ENVIRONMENTAL FACTORS

Success in seal hunting is highly dependent on environmental conditions. In the spring hunt, the condition of the ice as a travelling surface is critical. There are few things as heavy, discouraging and unsafe as a snowmobile bogged down in slush. The rate of melting of snow from the ice surface, and the drainage of water and slush through cracks and seal holes as the snow melts, affect both the mobility of hunters and the exposure of breathing holes where seals are taken. Weather affects the tendency of seals to bask in sunlight on the ice surface, where they are exposed to hunters rifles, while light, snow and wind conditions influence the seals awareness of danger.

2.3.3.7 HUNTING LEVELS

There are no reliable figures for the harvest of ringed seals in Lake Melville over an extended period, but the opinion of most older hunters is that the number taken currently each year is sharply down from far earlier years. Some attribute this to a reduced seal population, while others add that heavy snowmobile traffic makes the seals more wild, and may even drive some out of Lake Melville to the coast.

2.3.3.8 ECONOMICS

The viability of seal hunting as a contribution to family income depends not only on the success of the hunt itself but on the value of pelts and the cost of gas, ammunition and supplies. Rising costs, fewer seals and lower pelt prices, the trend in recent years, discourage hunting effort. On the other hand, young ringed seals are available just at the time when what is left of the frozen meat in the Rigolet store is stale, when many families most need cash because fishermen's unemployment insurance has run out or is about to, and when fishermen face the expense of gearing up for another fishing season.

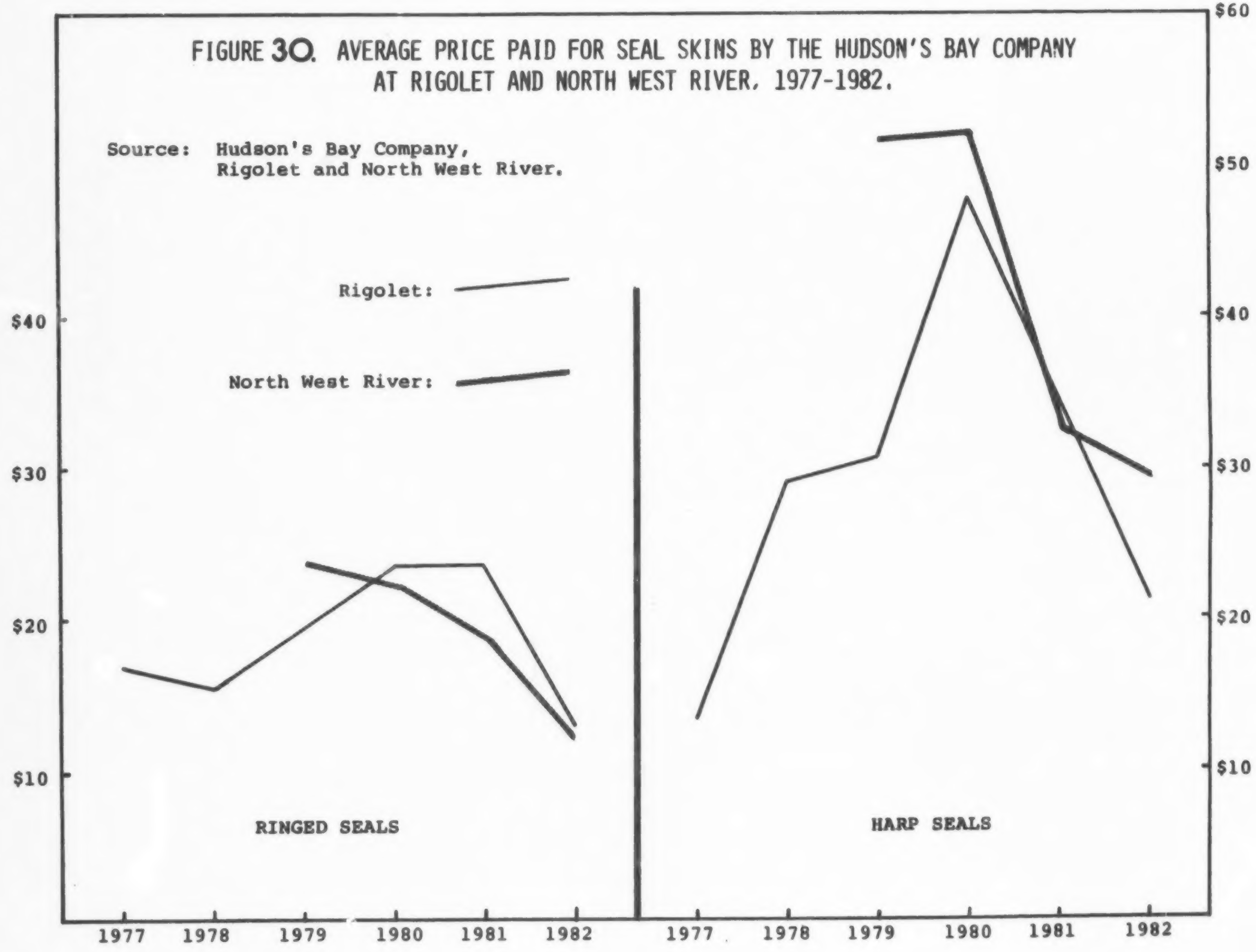
One Rigolet hunter estimated that he burns from eight to ten gallons of gas a day while hunting seals on the spring ice. At current prices for fuel and pelts, he would need two seals a day to pay for his gas alone. Another man was seal hunting for two weeks this spring and worked out his total expenses at $494.78. He made only $63.00 in skins. Another man estimated the cost of a 10-day trip to Big Point at $300.00, and figures he would need 25 seals to break even.

The average prices paid by the Hudson's Bay Company in Rigolet and North West River for ringed and harp seal pelts in recent years are shown in Figure 30.

The marginal economics of the hunt from a strictly cash standpoint must be balanced against the value of the meat, the value of hunting as a recreational activity, and the prominent role of hunting in the local culture. A high number of hunters, particularly from the western Lake Melville communities, hunt as much for sport as for meat or the cash return from pelts. The meat and cash, though welcome, count less heavily among these hunters.

Similarly, there is a strong element of recreation in seal hunting even for men hunting seriously for meat and pelts. The ice on a fine

FIGURE 30. AVERAGE PRICE PAID FOR SEAL SKINS BY THE HUDSON'S BAY COMPANY AT RIGOLET AND NORTH WEST RIVER, 1977-1982.



Source: Hudson's Bay Company,
Rigolet and North West River.

spring day is an exhilarating environment and men look forward to the opening of the season with keen interest. Although such values are difficult both to measure and to describe, it is clear that hunting has a place in the wellbeing and cultural identity of many residents of the Lake Melville area.

2.3.3.9 HUNTING EFFORT

The trends noted earlier - fewer seals, higher costs and lower prices - mean that sealing for serious hunters is a gamble. Conditions must be good if the gamble is to pay off. The effect of this is to compound the influence of environmental factors, to further discourage hunting effort when weather and travelling conditions are poor. Those hunting chiefly for recreation, too, will be discouraged by poor conditions, so that hunting effort and the level of harvest may vary widely from year to year.

Environmental conditions for the spring hunt of 1982 were extremely poor. The spring was one of the coldest in memory, and there were very few cracks in the ice, so that slush and water didn't drain off. This made snowmobile travel unusually difficult and costly, in terms of fuel and wear and tear on the machines. Several Rigolet hunters said they had never seen so few hunters on the ice.

2.3.3.10 SEASONAL VARIATIONS

Fluctuations in the level of seal harvest over the last few years can be seen in Figures 31 to 34, which plot the range of extremes and the median number of ringed or harp seal skins bought by the Hudson's Bay Company each month during the last few years. These figures cannot be taken to correspond exactly with harvest levels for each month, because of the time lag between killing seals and selling pelts. However, the graphs serve as a rough indication of the levels of harvest at various seasons, and are useful in comparing the hunt at the two ends of Lake Melville.

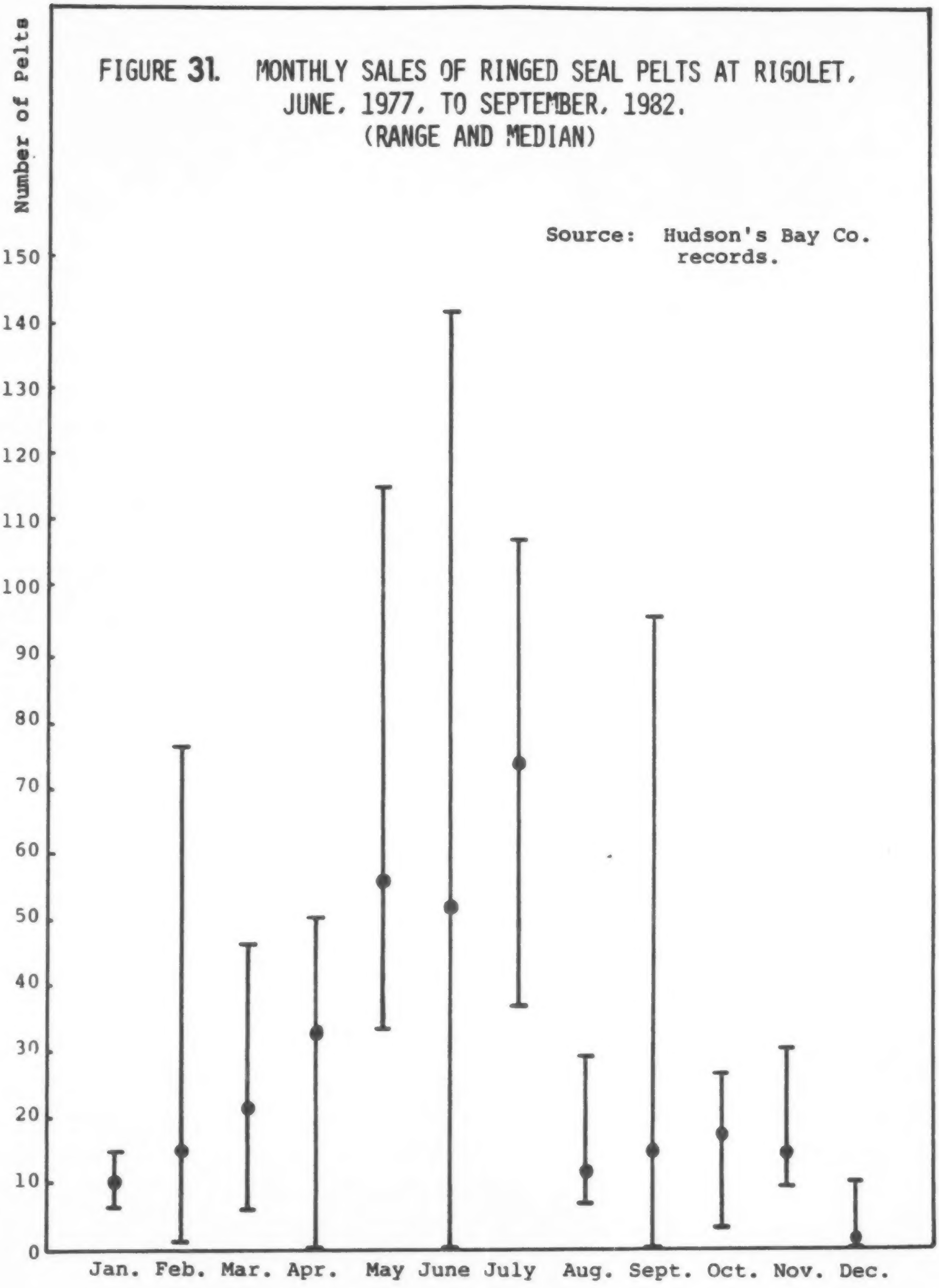


FIGURE 31. MONTHLY SALES OF RINGED SEAL PELTS AT RIGOLET, JUNE, 1977, TO SEPTEMBER, 1982. (RANGE AND MEDIAN)

Source: Hudson's Bay Co. records.

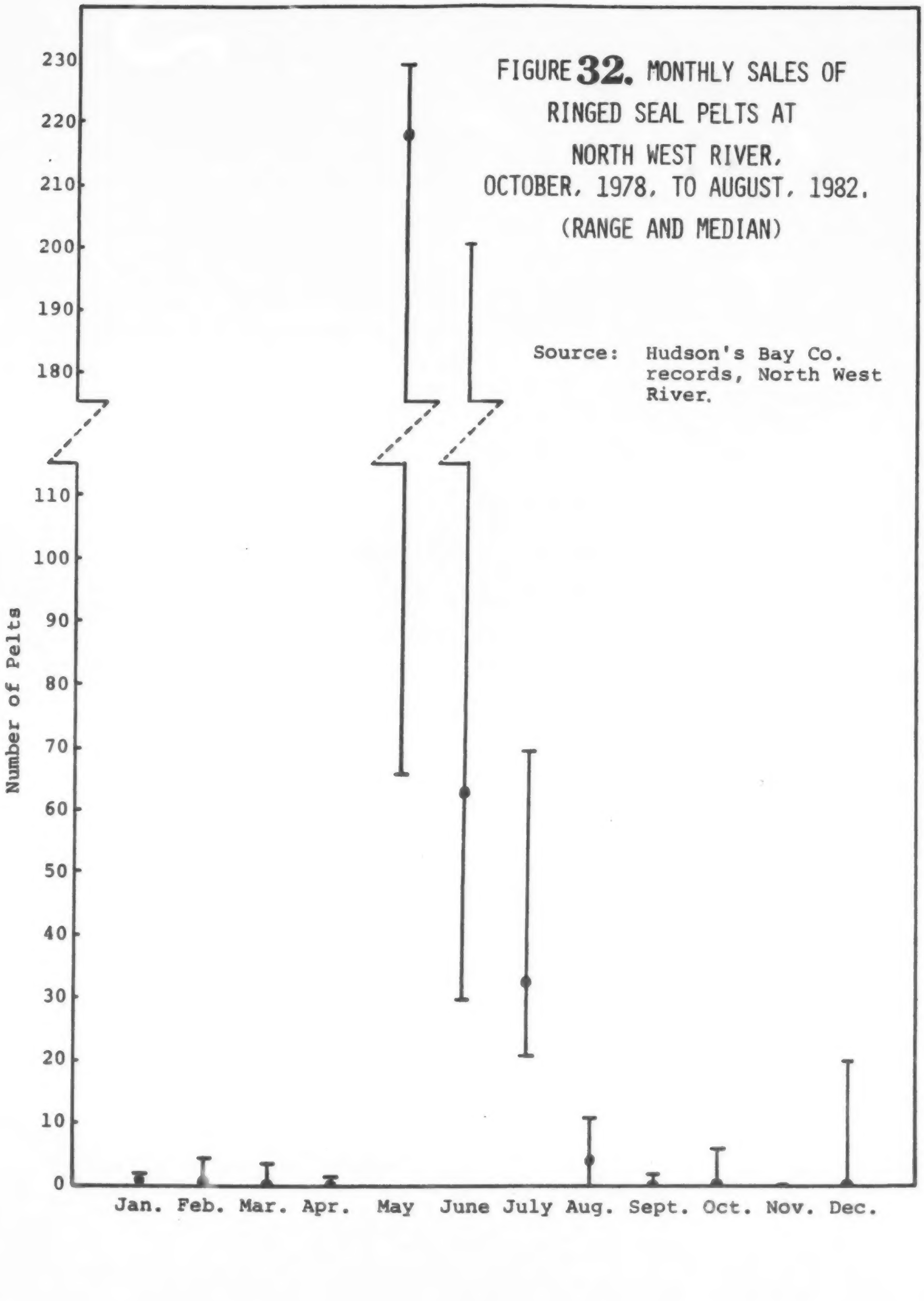


FIGURE 32. MONTHLY SALES OF RINGED SEAL PELTS AT NORTH WEST RIVER, OCTOBER, 1978, TO AUGUST, 1982. (RANGE AND MEDIAN)

Source: Hudson's Bay Co. records, North West River.

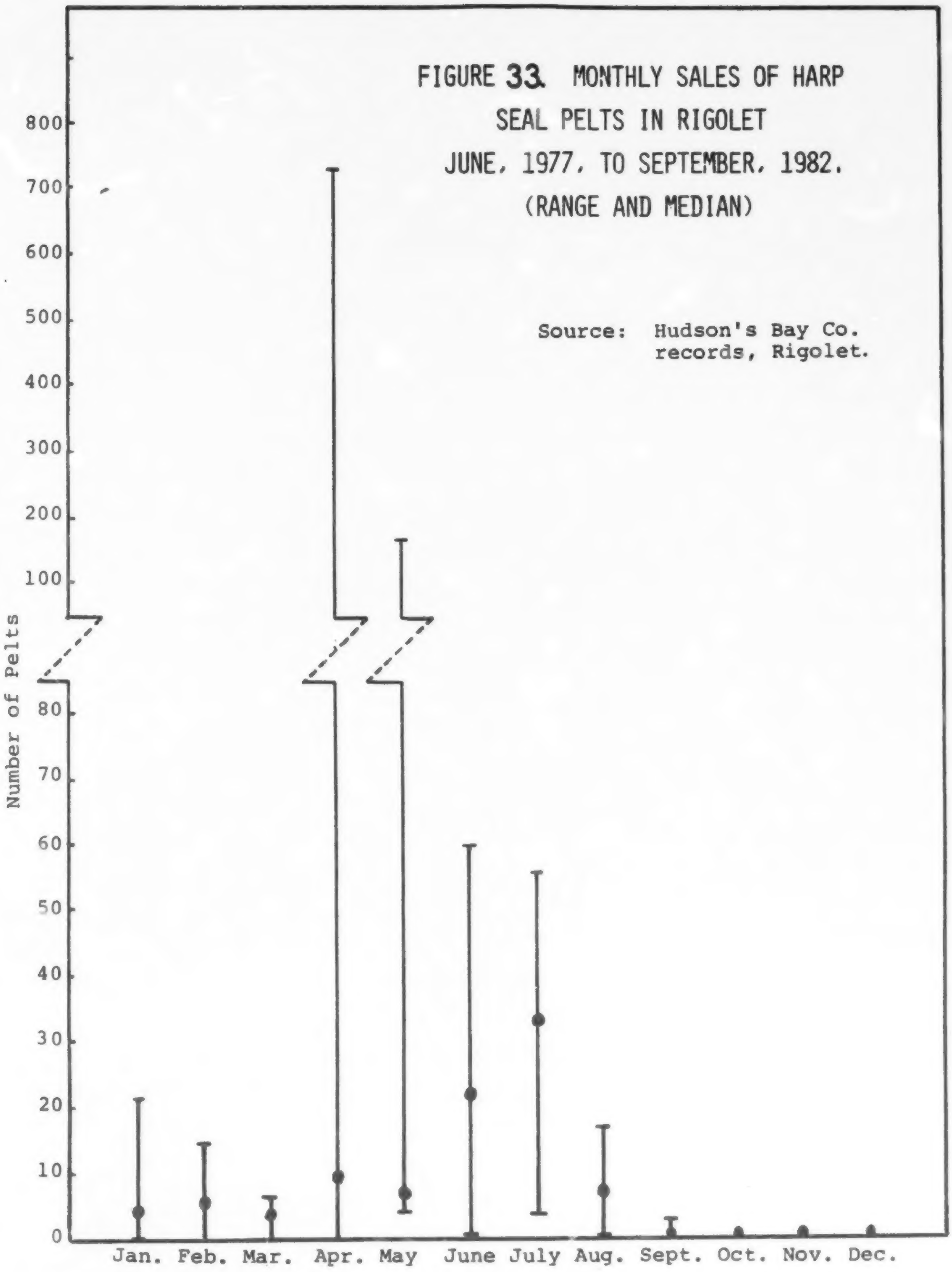
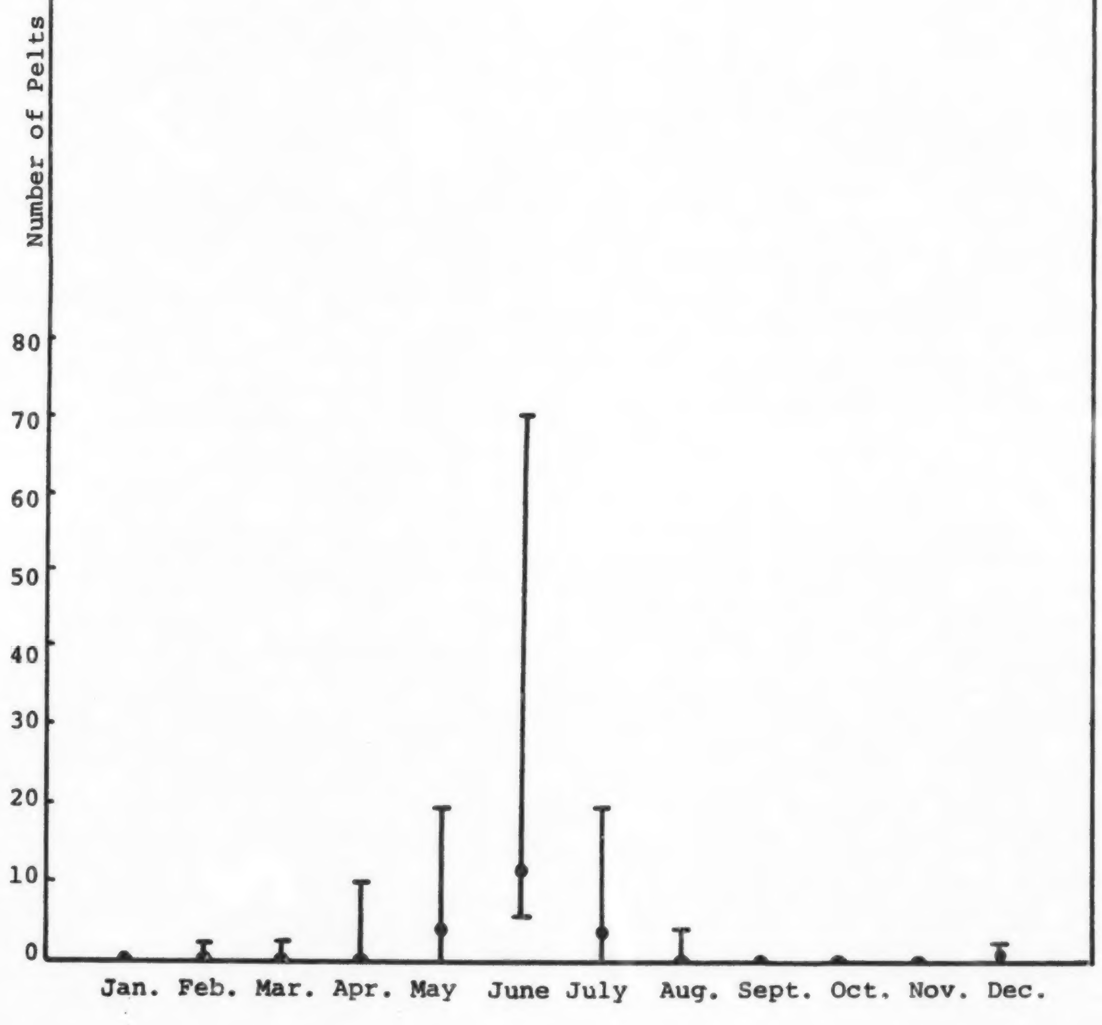


FIGURE 33. MONTHLY SALES OF HARP SEAL PELTS IN RIGOLET JUNE, 1977, TO SEPTEMBER, 1982. (RANGE AND MEDIAN)

Source: Hudson's Bay Co. records, Rigolet.

FIGURE 34. MONTHLY SALES OF HARP SEAL PELTS IN NORTH WEST RIVER, OCT., 1978, TO AUG., 1982. (RANGE AND MEDIAN)

Source: Hudson's Bay Co. records.



The graphs of ringed seal pelt purchases confirm the intense concentration of western Lake Melville hunters on the spring hunt and, in contrast, the duration of the hunt for most of the year in Rigolet. In the five years for which data are given, December is the only month in which fewer than 10 ringed seal pelts are normally sold in Rigolet.

For harp seals, apart from the freakish conditions of 1981, the normal harvest appears to be far more similar in the two communities. North West River gets a few harp seals in May, June and July, while Rigolet gets them earlier and in greater number. The harp seals taken in Rigolet in January may be either shot in the water as they move into Groswater Bay and Rigolet Narrows on their way south, or they may be "travellers" killed on the ice after freeze-up.

Harp seals do not have the ringed seals' habit of wintering under fast ice by keeping breathing holes open. When they are occasionally caught by freeze-up, they haul themselves up on the ice and begin a laborious and hungry trek in search of open water.

2.4 ICEBREAKER EFFECTS ON TRADITIONAL ACTIVITIES

The actual and anticipated effects of icebreaker traffic on sealing and other traditional activities on the ice surface can be discussed under three headings:

- The effect of the icebreakers on seal population and behaviour,

- The interference with sealing and other traditional pursuits, and

- The creation of additional hazards to travel on the ice.

None of these is an easy matter to document precisely. This section contains chiefly, a selection and interpretation of the views expressed by some residents of the Lake Melville communities during informal interviews.

2.4.1 POSSIBLE EFFECTS ON SEALS - HUNTERS' VIEWS

An earlier section of this report contains research on the possibility that the icebreaker track may influence the distribution of ringed seals in Lake Melville. Hunters in the area, particularly Rigolet, worry about the effects of noise, disturbance to the ice which is a key feature of the ringed seals' winter habitat, disturbance of females during the whelping period, and the possibility that seals may congregate in the open track and follow it out to Groswater Bay, leaving the Lake Melville population reduced.

It is difficult to evaluate any of these concerns with precision. The experience with icebreakers in Lake Melville has been irregular and no baseline studies have been done, prior to now, documenting any trends.

One man who worries about seals leaving the lake believes it won't be the breeding females, which tend to winter in established whelping areas, but the older male seals and non-breeders. He thinks the only breeding females to leave will be those whose birth lairs are disturbed by the icebreaker. In 1981, he saw seal pups on the ice in Groswater Bay, something he had never seen before. He believes that some young mothers, which whelp later than the older ones, had their birth lairs broken by the icebreaker shortly before they gave birth. They followed the track out through Rigolet narrows to Groswater Bay, where they had their pups beside breathing holes used by older, non-breeding seals. In this situation, pups would not be sheltered in a den hollowed out beneath a drift but would be exposed on open ice, where they are likely to perish from cold or fall prey to ravens or foxes.

Because pregnant females are undoubtedly the most vulnerable to direct interference from icebreakers, Rigolet hunters were angry with the icebreaking experiments of the **M.V. Arctic** in March, 1981, when this ship wandered back and forth around Lake Melville, through areas they knew were used by ringed seals for whelping.

2.4.2 INTERFERENCE WITH HUNTING AND TRAVEL

While the effect of icebreakers on the ringed seals in Lake Melville remains uncertain, the same cannot be said about the effects on travel and hunting. To residents of the communities around the shore, the ice is a travelling surface, not an obstacle. There is a fundamental clash between the interests and outlook of those who must use the ice for their pursuits and those who must cut it up for theirs.

Lake Melville is not the only arena for such a clash, nor the first. In Greenland in 1975, Inuit hunters on dog sleds blocked the path of the icebreaker **Sigyn** as it plowed through the ice of the Uummannaq Fjord enroute to a new lead-zinc mine. This action reportedly led to negotiations which prohibit shipping in the fjord from December to June. Promotion of the Arctic Pilot Project, which would see Canadian Arctic gas shipped to European or North American markets by icebreaking tankers, has generated a variety of social and environmental concerns, among them the possibility of interference with traditional means of travel. Similarily, experiments with year-round shipping on the St. Lawrence Seaway have had to consider a variety of alternatives for those who currently use the ice as a travelling surface.

A navigable track through the ice of Lake Melville, which presumably is the hope of those financing the icebreaker study, would effectively cut some of the residents of North West River and Rigolet off from about half the environment they exploit in winter and spring.

A full study of the impact of this possibility was beyond the scope of this report, but there is no question the issue is viewed as critical by most people of Rigolet. The issue is probably of less concern to hunters of Happy Valley, because they can travel on either side of the track, though they would be confined to one side once they had travelled some distance down the lake.

It is not easy to be precise about the intensity of use of the territory which would be barred to people of Rigolet and North West River by an open track down Lake Melville. In the absence of registered traplines and well-defined family hunting territories, there are no easy measures to hunting activity or of the value of a region in terms of the income, food and recreation it provides. Subsistence hunting, trapping and fishing are above all flexible, opportunistic pursuits; both the effort and the rewards gained in return are highly subject to influence by weather, game populations, costs and the range of alternatives.

The area which would be rendered inaccessible to Rigolet residents by weak ice or an open track of water includes Back Bay and the entire south shore of Lake Melville, including the English River area and the slopes of the Mealy Mountains.

It is unlikely that the Mealy Mountain area itself is widely used since the decline of caribou, the chief game animal in that area, led to a ban on hunting some years ago. However, many Rigolet residents trap and hunt around the shores of Back Bay, and fish through the ice for trout at the mouths of rivers draining into Back Bay and the south shore of Lake Melville. In February of this year, eight Rigolet residents were living in Back Bay. Two were trout fishing, two were sealing and the other four were apparently just there because they like it. One informant reported that if the trouting was good another eight to ten people would move down later.

A much more detailed analysis of the use of various hunting areas around Rigolet is available in "Our Footprints are Everywhere" (Ames 1977), a land use and occupancy study prepared by the Labrador Inuit Association.

The southern shore of Lake Melville is important to people of the Rigolet area chiefly in terms of sealing. Several traditional seal-netting berths are at the entrance to Back Bay and to the westward, along the southern shore of the lake. Perhaps even more importantly, different ice conditions on the southern shore extend the spring ringed seal hunt by a week or more in most seasons. Ice on the north shore, exposed to strong spring sunlight and accelerated run-off, melts and breaks up sooner than the ice along the southern shore, which is shaded by the Mealy Mountains. Rigolet hunters commonly hunt from the Charley's Point and Lowlands area early in the season, then move south across to Frenchman Point and Big Bay later on.

Some hunters believe young ringed seals are more common in the southern half of the lake. Others point out that if half the lake is inaccessible, there will be more hunters and more disturbance from snowmobiles in the area that they can reach. This congestion would seriously affect the hunters' success, if seals are continually on guard. Some men believe this was one of the problems in 1981, when the icebreaker roamed widely through the lake and left weak areas which had not frozen completely by the time of the spring hunt, so that most hunting was confined to the north side.

The icebreaker trials in January and March of 1982, which stopped in the area of Green Island, did not interfere much with hunting on the southern shore west of St. John Island. Men could drive around the western end of the track, though this meant a wide detour for anyone visiting Back Bay. However, more extensive penetration of the lake would bar the way until the track freezes again and more frequent icebreaker traffic could mean it might never be safe.

Another probable impact of icebreaker traffic on traditional forms of travel is that the ship's track appears to hasten the process of breakup. Some hunters estimate that even the limited, experimental probes conducted so far have cut the breakup period by 10-14 days. A close study of breakup was beyond the scope of this work, but it seems apparent that breakup is a process that picks up speed as the main central pan of ice in a body of water begins to fracture, exposing more and more surface to the effects of wind and waves, and to the stress and abrasion of contact with other bodies of ice on either side. Hunters have observed that the icebreaker track, a band of broken ice knit together by frosty weather after the ship has passed, is weaker and melts out faster than the unbroken ice around it. As the track opens up, the ice on either side is able to pull away from shore, especially where its edge is melting from exposure to spring run-off. Soon, what had been a tight, unbroken body of ice becomes a shifting mass of smaller pans, melting and breaking up more quickly. The icebreaker gives this natural process a head start.

This has obvious consequences for those who hunt and travel on the surface of the ice; it cuts down the period which such activity is possible. However, it must be admitted that some hunters, at least in the western Lake Melville area, welcome the change. Two Happy Valley hunters both said they find seal hunting easier and more enjoyable by boat. Hunting in the water is more expensive, because of greater fuel consumption by their outboard motors, but on balance they believe that for them the icebreaker has improved the hunt by extending the period when seals can be shot in the water.

Researchers recognized the importance of this issue, the acceleration of breakup, quite late in the study period and did not have time to evaluate this question more thoroughly. It seems possible that an early breakup is of more advantage to hunters in western Lake Melville than in Rigolet, because the ice near their communities gets rotten and unsafe somewhat earlier, flooded by the numerous rivers that empty into the western end of the lake. When the ice is firm it is a great benefit to hunting and travel, but once it becomes unsafe then the sooner it disappears the better.

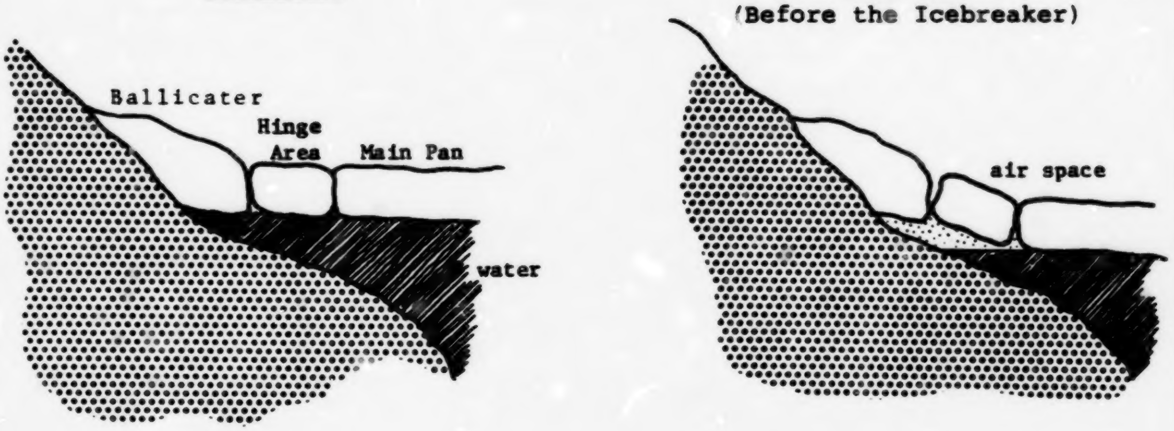
2.4.2.1 INTERFERENCE WITH NETTING

Another effect of icebreaking on sealing relates to the use of nets beneath the ice. One man described in some detail the kind of place he likes to set his nets, and the effect on the ice when an icebreaker passed, fracturing the ice at the junction between the main pan, floating on the tide, and the shelf, widely known in Labrador as the "ballicater". Between the ballicater and the main pan of ice there is often a narrow band of ice which serves as a kind of double hinge, tipping down as the tide falls but held to the ballicater by friction on its edge, (see Figure 35). This creates a long air space or lead which seals use as a breathing place, and which enables them to fish in the shallower water

FIGURE 35. SUGGESTED EFFECT OF ICEBREAKER ON RINGED SEALS' SHORE-ICE HABITAT

HIGH TIDE

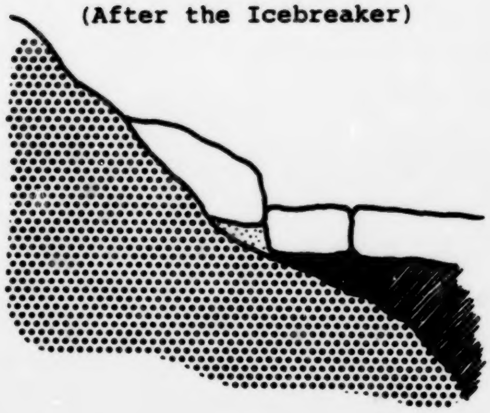
LOW TIDE
(Before the Icebreaker)



Normally, low tide leaves an air space under the ballicater and the hinge area of ice along the shore. However, when an icebreaker cuts through the main pan of ice, the ice moves away from shore enough to allow the hinge area to drop with the tide, cutting off the air space and forcing seals to leave the shore area.

(Based on sketch and description by John Shiwak, Rigolet.)

LOW TIDE
(After the Icebreaker)



along the shore. Such a place can be a good seal net berth.

When an icebreaker passes, cutting through the main pan of ice, the ice along the shore may shift as it moves toward the space left in the ships track. The hinged area collapses back to the water level, closing the air space, and the site is no longer a likely place to net seals. The man who described this effect believes that many seals use this air space as an alternative to their own breathing holes. When the space closes they may move to the ship's track to find new places to breathe. The track would in effect become a new, but temporary, lead which enables seals to make and maintain new breathing holes.

Another man, who had missed the forewarning of the icebreaker's March, 1982, visit, was visibly upset when he heard the vessel was due the next day. He explained that his nets were near an area of open water, and that if the ice shifted about on the wind or tide after the icebreaker passed, he could lose them. He immediately made plans to retrieve his nets the next day.

2.4.3 HAZARDS TO TRAVEL

The final area of the icebreakers' impact on traditional activities, and perhaps the most serious, is in the creation of added hazards to travel on the ice surface. It should be kept in mind that drowning or exposure when snowmobiles break through weak ice is already a leading cause of accidental death on the Labrador coast. [The RCMP do not compile fatality statistics on a cause-of-death basis, and drowning from snowmobile accidents might well be classed with other drownings if they did. But RCMP Staff-Sgt. Hunt of the Goose Bay Detachment confirmed the researchers' impressions that such incidents are one of the commonest forms of accidental death in Labrador Coastal areas. He was uncertain whether they would out-number drownings from boating accidents, but believed they would run a close second at least, and he guessed that they average two a year. Drowning, rather than death by exposure, is the usual result of such incidents, because most victims are unable to haul themselves back out onto the ice. A more detailed examination of this question would involve sifting through individual accident reports going back a number of years.]

In communities without a highway system, the open, unobstructed surface of frozen bays, lakes and rivers gives access to the environment from which residents draw much of their livelihood. In this context, snowmobile fatalities are the Labrador equivalent of highway accidents, and they have many of the same causes, including carelessness and drinking, poor visibility, mechanical failure and so forth.

To this existing background of risk, a new element is added. It is difficult to assess the severity of this added risk. Perhaps a good beginning is to compare the icebreaker track to washouts on a highway. The chief difference is that given time and the right conditions, the gap in the ice can mend itself. On the other hand, it can also appear to have done so and still be quite unsafe. It can freeze over very lightly and then disappear under fresh snow. Perhaps the greatest element of risk is that the risk itself is so variable.

There have already been a number of close calls, and if the individuals involved were less hardy, resourceful or lucky, any one of these incidents might have ended in death.

Like cars, the speed and power of snowmobiles can be deceptive; a driver can get into trouble very quickly. Sometimes a driver counts on power to get him out of trouble, and sometimes it does. Leonard Sheppard, the Chairman of the Rigolet Community Council, says people push their luck with bad ice. "You almost have to sometimes", especially if the alternative is a 50-mile detour. Some people gamble that if they go fast enough they can cross a bad place before they break through. If a gap looks narrow, of if the icebreaker track has a good steady pan in the middle of it, they may make a run for it.

Mr. Sheppard's son, Barry, broke through thin ice in a crack near the beginning of the icebreaker track several years ago. He came to a crack where the ice had parted from shore - broken loose by the icebreaker's passing - and got off his snowmobile to look for a place to cross. There were several minor cracks in the same area, and as he jumped across one, which looked narrow, he fell through. He managed to pull himself out. A companion, who was farther ahead, would not have got back in time to save him if he had been too weak to haul himself out. The companion had no matches and Barry's were wet. He spent several hours waiting, soaked through, while his companion went to get a boat and come back for him. He was taken to the warmth and safety of a cabin five miles away. If he had been alone, of if it had been colder, he might easily have died of exposure.

Job Hopkins of Mud Lake, hunting seals in the Lowlands area, lost his snowmobile, komatik and everything it carried when he broke through weak ice in the ship's track in the spring of 1981. He saved himself and the rifle slung over his back, and walked to shelter. Most people who drive snowmobiles through thin ice do not get out. Heavy winter clothing, soaked in water, drags them down. In any case, the water is so cold that only a few minutes of struggle is possible.

Ron Pottle of Rigolet, walking on the ice outside of Charley's Point, stepped through a soft spot and went in to his waist. Some friends got him out.

Derek and Wendy Pottle of Rigolet, returning from Back Bay in 1980, didn't know the icebreaker had been through and came quite unexpectedly to the track of open water. If they had been driving at night, as they sometimes do on that trip, they might have driven right into it. As it was, they had to stop and wait for some loose pans to drift together and form a kind of floating bridge before they could cross.

In March of 1982, a number of people in Rigolet, a researcher from this study and the officials of the icebreaking probe went to some lengths to pass a warning to two men in a similar situation, returning to Rigolet from the south side and unaware that the icebreaker might pass earlier than previously announced. The weather was good and people were afraid the men might linger on the other side and start home at night, and if they were unaware of the vessels passing, drive into the open ship's track. A series of phone calls between Rigolet, Goose Bay, St. John's and the vessel itself led to instructions that the ship not proceed into the ice that night so as not to create a hazard to the men. As it turned out, the men returned just before the icebreaker arrived at Rigolet and the vessel then proceeded into the ice.

A range of factors influence the hazards a ship's track might pose for snowmobile traffic. Among the most obvious are the following:

- The environmental conditions - chiefly temperature, tide and wind - which determine how quickly the track can re-freeze enough to be safely crossed;

- The degree of snow cover, which can both slow the rate of freezing and hide the track itself, or areas of weak ice within or around it;

- The effect of the icebreaker track on the timing and pace of break-up, a period of unsafe and fast-changing conditions;

- The size and thickness of pans of broken ice left in the ship's track itself, which freeze together again if conditions are right;

- The number and size of peripheral cracks along the ship's track itself, which are often wide enough to fall through;

- The ability and willingness of authorities to seek ways to reduce the risk;

- The ability of residents to keep informed of icebreaker traffic, to recognize the track when they approach it, and to exercise caution.

It would take considerable work to evaluate these factors thoroughly. At the same time, whatever can be learned from the experiments of irregular, experimental icebreaker probes conducted so far would have to be re- examined in the context of regular shipping, if that ever comes about. For example, would the track be continually open or would it still re-freeze in a few days of cold weather? Would repeated passage of ships up the same track build a distinct ridge of ice rubble on each side of the track, making the position of the track obvious even after it has frozen and drifted over? Would regular traffic permit some shifting of the main bodies of lake ice in a strong wind, leaving gaps in the ice surface used in travel routes along the shore?

It was beyond the scope of this project to evaluate this risk in detail. But the incidents listed and the obvious concern of the residents make it clear that a genuine and serious hazard has been added to the lives of those who travel on the ice of Lake Melville.

PART III ECONOMIC AND NUTRITIONAL VALUE OF RINGED SEALS TO THE LAKE MELVILLE AREA

3.1 INTRODUCTION

Fishing, hunting and trapping in the Lake Melville area remain of vital importance to the people of Rigolet and to a number of households in North West River, Mud Lake and Happy Valley. In this section an attempt has been made to examine the value of ringed seals harvested in the Lake Melville area in terms of human food and economic value.

3.2 METHODS

3.2.1 HOUSEHOLD SURVEYS

Household surveys of hunters were administered in the communities of Rigolet and North West River (see 2.2.1) to collect historical information on the level of the harvest, selling of skins and food preferences.

3.2.2 WILD FOOD RECORDS

During the year from June 1980 to June 1981, 92% of households in Rigolet participated in a food availability study by recording the amount of wild food eaten in their household. Information was recorded on a diary and collected weekly by a local fieldworker.

This data collection was part of a larger study on the use of wild and imported food in five Labrador coast communities conducted by M. Alton Mackey and R. Orr (unpublished).

3.2.3 OTHER SOURCES

Seal pelt shipment data from the Hudson's Bay Company in Rigolet and North West River were collected to determine numbers of skins sold and prices paid to sealers (see 2.2.4). The Canada Department of Fisheries and Oceans were contacted for their data related to the Lake Melville ringed seal harvest.

3.3 RESULTS

3.3.1 EVALUATION OF THE CONTRIBUTION OF SEAL TO THE LOCAL DIET

All weight data was collected in pounds and conversions made to kilograms. During the year from June 1980 to June 1981, (52 weeks) weekly wild food records were completed by 92% of the households in Rigolet listing the amounts of wild food caught for human consumption. Table 7 reports the amount of seal consumed during this period corrected to reflect 100% of the households in Rigolet.

From the questionnaires completed by 51 Rigolet hunters in 1982 from 42 households, 435 young* and 54 mature* ringed seals were taken in 1981. If the young seals average 21 kg (47 lbs.) and the mature seals 52 kg (115 lbs.) as was found in the Clyde Region of the North West Territories (George Wentzell, pers. comm.) and 43% of a ringed seal is consumed (Kemp 1975) this represents a yield of approximately 5,194 kg (11,450 lbs.) of edible ringed seal meat available to the community of Rigolet in 1981. Hunters reported taking 485 young and 30 mature ringed seals, representing an edible yield of approximately 5,119 kg (11,285 lbs.) of ringed seal meat available in 1980.

In North West River, in 1981, 44 hunters reported a catch of 302 young and 11 mature ringed seals which represents approximately 3,016 kg (6,650 lbs.) of edible ringed seal meat. During the previous year the hunters recorded a catch of 292 young and 5 mature ringed seals. This represents 2,790 kg (6,150 lbs.) of ringed seal meat. The North West River figures represent only a portion of the seals caught in western Lake Melville.

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* As designated by hunters themselves. Young and "pullamers" are grouped together.

TABLE 7

Amount of Seal Meat Consumed by Humans in Rigolet June 1980-June 1981.[1]

Species of Seal	Amount Consumed[2]	
	Kilograms	Pounds
Jar (ringed)	1591	3500
Harp-Bedlammers	1389	3057
-Mature	726	1597
Square Flippers (bearded)	17	37
Ranger (harbour)	19	41
Grey	20	45
Bay (harbour)	3	7

1. Alton Mackey, M. and Orr, R. unpublished data.

2. Data collected in pounds.

Ringed seals caught in the Rigolet area or in the western Lake Melville region were not measured or weighed. Weights of ringed seals used in these calculations have been derived from data collected by George Wenzell in 1971-72 (Wentzell, 1981; pers. comm.).

Country food has nutritional, social and cultural values which cannot be replaced by any substitute and cannot be measured by market criteria or evaluated in cash. In short, food is an integral part of a way of life (Usher 1976). Having said that, substitution costs for ringed seal must be ascertained on the basis of sources of protein which are similar to that of seal.

For this reason red meat has been chosen as an alternative for the purposes of this study. (To replace seal meat with sources of protein which are radically different from seal, such as beans or tinned meat, would imply a loss of quality of life, regardless of the price or nutritional quality of the substitute.)

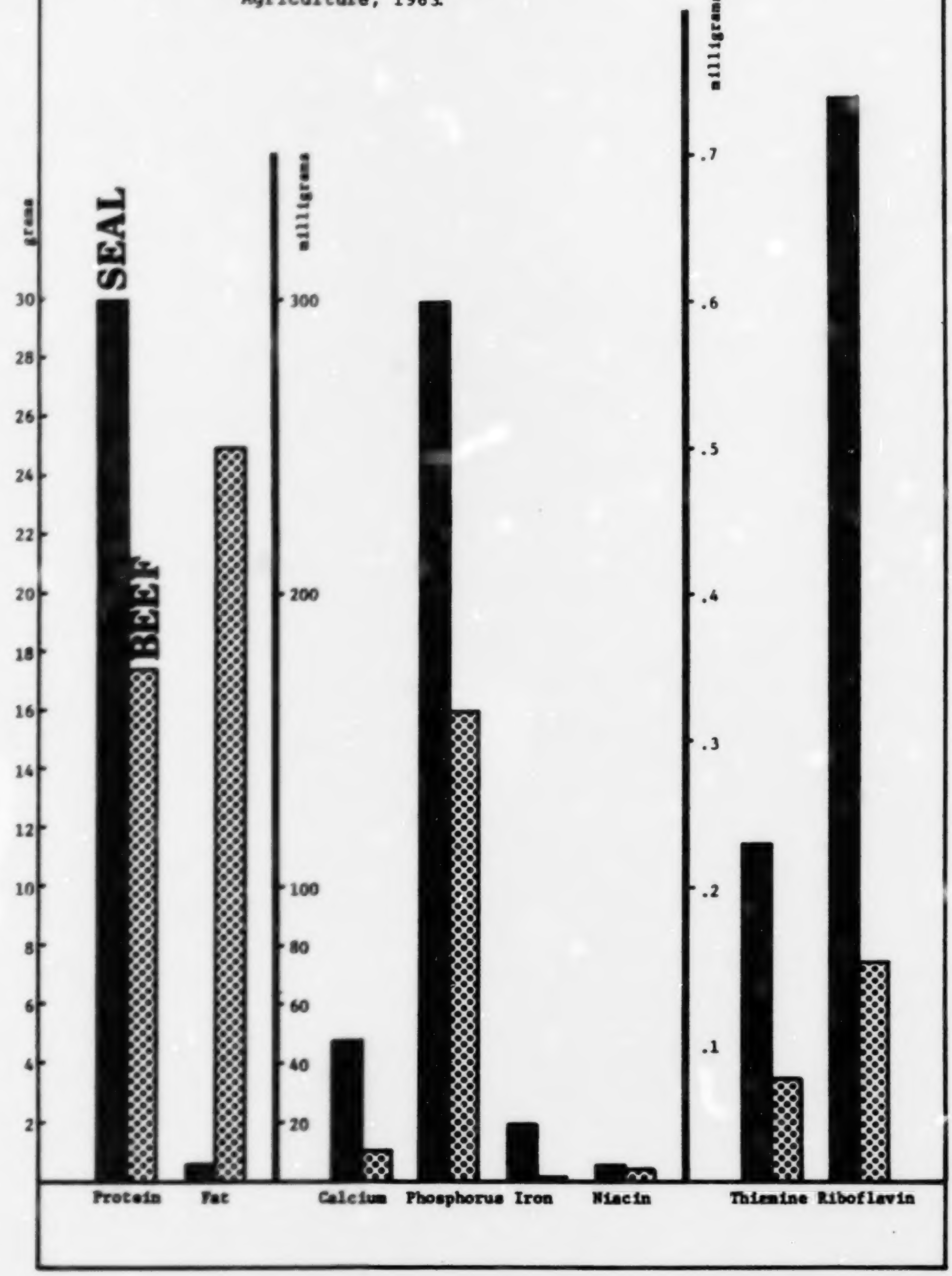
Figure 36 shows the relative nutritional value of ringed seal and beef. From this data it is apparent that 1 kg (2.2 lbs.) of seal has the equivalent protein value of 1.5 kg (3.3 lbs.) of domestic red meats.

During the year from June 1980 - June 1981, surveys of store foods were conducted in Rigolet. During that period of time, the average price recorded for imported red meats was $7.70/kg ($3.50/lb.) (Alton Mackey, M. and Orr, R., unpublished data). Table 8 shows the replacement value of ringed seal for Rigolet and North West River in 1989 dollars.

For some households in Rigolet, seal meat makes a major contribution to diet while for others it is a minor contribution. In Rigolet, from June 1980 to June 1981, 53 out of 59 participating households consumed ringed seal meat in amounts ranging from one kg (2.2 lbs.) to almost 180 kg (400 lbs.) A breakdown of consumption patterns is as follows: two households consumed between 45 kg and 90 kg (100-200 lbs.) of ringed seal meat (aver. 54 kg or 120 lbs.); the 40 other households consumed an average of approximately 14 kg (30 lbs.) of ringed seal meat. The

FIGURE 36. PROXIMATE COMPOSITION OF RINGED SEAL AND BEEF.

Sources: Health & Welfare Canada, 1972
Heller and Scott, 1963
United States Dept. of
Agriculture, 1963.



substitution value of this meat ranges from $158/household to $2,147/household. Of the 13 households which consumed more than 45 kg, the average substitution value was $830 in 1980 dollars.

TABLE 8

Replacement Value of Ringed Seal Meat.

	Rigolet			North West River		
	Amount kg (lbs.)	Equiv. Amount kg (lbs.)	Value $	Amount kg (lbs.)	Equiv. Amount kg (lbs.)	Value $
Actual 1980-81[1]	1591 (3500)	2387 (5250)	18375.			
Projected 1980[2]	5119 (11285)	9676 (16928)	59071.	2970 (6150)	4184 (9225)	32195
Projected 1981[2]	5194 (11450)	7791 (17175)	59941.	3016 (6650)	4525 (9975)	34813

1. Alton Mackey, M. and Orr, R. unpublished data, Memorial University.
2. Estimated yield from questionnaires completed by hunters.

During the same period, 42 out of 60 participating households consumed harp seal meat. Of these 42, eight households consumed between 45-90 kg.; one ate between 90-135 kg. (200-300 lbs.), another used more than 227 kg. (500 lbs.) and one household relied on more than 680 kg. (1,500 lbs.) of harp seal meat.

In the household survey in Rigolet and North West River, the hunters were asked about their preferences for ringed seal meat. The majority preferred young seal that had been shot. No one preferred seal that had been caught in a net. The preferred food portions of the animal are listed in Table 9.

TABLE 9

Preferred Food Portions of Ringed Seal Based on Survey Results from Rigolet.

Food Portions	Rigolet (n = 42)	North West River (n = 50)
	%	%
Ribs	33	30
No Preference	24	26
Flippers	16	13
Liver	14	13
Other	12	18

The hunters were asked whether or not they sold all of their ringed seal skins. Seventy-three percent of the hunters in Rigolet and 64 percent of the hunters in North West River indicated that they sold all of their pelts. Of the hunters who said they did not sell all of their seal skins to the store, estimates ranging from 5-50% of the pelts (with an average of 10%) were given for the number used in crafts and for other uses in Rigolet. An average of 38% of pelts were kept for other uses in North West River.

3.3.2 THE CONTRIBUTION OF THE SALE OF SEAL SKINS TO THE LOCAL ECONOMY

Information was collected from the records of the Hudson's Bay Company in Rigolet and North West River about the sale of seal skins. Since 1979 the total paid to Lake Melville hunters for ringed seal pelts has been $56,612. Table 10 summarizes the yearly sales to the Hudson's Bay Company stores.

TABLE 10

Total Dollar Value of Ringed Seal Pelts Purchased by Hudson's Bay Company Stores in North West River and Rigolet (1979-1982).

Year	Value
1979	$18,301
1980	19,200
1981	14,099
1982	5,012*
	$56,612

* represents only the sales in the first 8 months of 1982.
Source: Hudson's Bay Company.

Fisheries and Oceans Canada was contacted to obtain historical data on the ringed seal harvest in the Lake Melville region. No information was available on the harvest for 1980, 1981, or 1982.

3.4 DISCUSSION

Because of the variations in the harvest of ringed seals, it is extremely risky to make general inferences from occasional statistics. However, it can be clearly shown that the harvesting of ringed seals provides a significant economic input into households in Rigolet and some households in western Lake Melville communities.

Food preferences and habits are important parts of cultural heritage. Market criteria alone cannot adequately evaluate the nutritional, social and cultural values of country foods. In a society such as the one in the Lake Melville area, hunting is a central and long-standing tradition. Thus foods have a special meaning related to their procurement, distribution, preparation and eating. Food and its related activities are important elements of the way of life of the region.

Seal meat is an exceptionally nutritious food. It contains more high quality protein, needed for body growth and repair, and less crude fat than domesticated animals such as beef and pork and the flesh of fat or moderately fat fish. Seal meat is a very rich source of iron (7.5 times as much as beef) needed for the development of haemoglobin, the carrier of oxygen, in the blood. Seal meat is also a rich source of Vitamin A, containing 20 times the amount found in the muscle tissue of beef. Seal meat is low in fat and the fat that is present is relatively unsaturated as determined from its iodine number (121). Because of its low fat content and high content of myoglobin, seal meat has a high nutrient density with one-third of the energy equivalents found in beef.

Ringed seals provide an important and frequent contribution to the protein requirements of the community of Rigolet and are utilized to a lesser degree by the families and friends of hunters from the western Lake Melville area. In the latter area, ringed seal meat is also sold.

The protein contribution made by ringed seals is more important for some households than others.

From the 1980-81 Food Availability Study data (Alton Mackey and Orr, unpublished) it is evident that some households utilize much more seal meat than others. In terms of 1980 dollars ringed seals provided more than $2,000 in food equivalents for one household in Rigolet and an average of $830 for the 13 households consuming more than 45 kg of ringed seal meat. In addition to ringed seals, the meat of harp seals, when available, provides an important contribution to the Rigolet diet. For example, in 1981 nine households consumed an average of 89 kg. (195 lbs.) of harp seal meat which represents a value of $1,024. One household ate 689 kg. (1,520 lbs.) of harp seal meat which had a replacement value of $7,980. In March 1981, there was an exceptional opportunity to harvest large numbers of harp seals. If harp seal meat was not available, it seems reasonable to assume that a greater quantity of ringed seal meat would have been retained for human food.

No data was obtained for seal meat fed to dogs. In addition to household pets, there are only a few teams of sled dogs in the Lake Melville area.

From the records of the Hudson's Bay Store, it appears that from 45 to 75 percent of the ringed seals harvested in Rigolet, and 90 percent of the ringed seals harvested in western Lake Melville are taken during the period between freeze-up and the opening of ice free navigation. The economic replacement value of the meat from the ringed seal harvest estimates for this period (Table 11) would be from $26,500 to $44,300 in 1980 and $27,000 to $45,000 in 1981 for the community of Rigolet, and $29,000 in 1980 and $31,300 in 1981 for North West River. The consumption and value of seal meat procured by hunters of the other western Lake Melville communities is unknown.

TABLE 11

Economic Value of Ringed Seals Harvested at Rigolet and North West River Between Freeze-up and Break-up.

	Rigolet			North West River		
	Meat $	Pelts[1]	Total	Meat $	Pelts[2]	Total
1980	26500-44300[3]	7071	33571-51371	29000	7805	36805
1981	27000-45000[3]	6008	33008-51008	31300	5318	36618
1981	7875[4]	6008	13883			

1. Does not include pelts not offered for sale to Hudson's Bay Company.

2. Includes pelts of other western Lake Melville hunters.

3. Projected from estimates.

4. Actual data from the Food Availability Study (Alton Mackey and Orr, unpublished).

In 1981 the recorded consumption of harp seal meat in Rigolet was 56% of the total seal meat consumed (Table 7) with an economic replacement value of $21,400. (It should be noted that harp seal availability was bizarredly high in March, 1981.)

The sale of seal skins contributes to the cash economy of both Rigolet and western Lake Melville. From the Hudson's Bay records of seal pelt sales by hunters in Rigolet, it appears that from 45-75% of all of the ringed seals harvested are taken during the season between freeze-up and break-up, thus any activities which interfere with the ability of residents to prosecute the ringed seal hunt would reduce their already limited cash income and procurement of food. Sales of ringed seal pelts by Rigolet hunters during this period from freeze-up to break-up as recorded by the Hudson's Bay Company were as follows: $4,967 in 1979, $7,071 in 1980, $6,008 in 1981 and $1,422 in 1982. The values for June were included in these figures as seal skins must be scraped, cleaned and dried prior to being offered for sale. In North West River the majority of ringed seals are harvested in the spring and the pelts offered for sale to the Hudson's Bay Company by June. The value of these pelts was as follows: $7,352 in 1979, $7,805 in 1980, $5,318 in 1981 and $1,259 in 1982. Seal skins are also utilized for clothing, crafts and other utilitarian purposes. There are also an unknown number of seal skins and seal skin crafts and clothing sold to visitors or outside of the community. We have not valued this aspect but for Rigolet at least it is known to be substantial.

When the value of seal meat and the amount received from the sale of pelts are considered together, without the addition of crafts or clothing made of seal skin, it can be shown that the harvesting of ringed seals makes a very real contribution to the economic well-being of households and communities. Table 10 outlines the estimated economic value of ringed seals harvested between freeze-up and the opening of ice-free navigation. The contribution that this hunting activity makes cannot be ignored.

While no recent data on ringed seal harvest levels was available from

Fisheries and Oceans Canada, Boles et al (1980) reported harvest information for ringed seals in Rigolet and western Lake Melville during the period 1972-1979 (see Table 12). The source of the data was Fisheries and Oceans, St. Johns, Newfoundland and Goose Bay, Labrador.

Table 13 shows the recorded numbers of ringed seals harvested as supplied by Fisheries and Oceans Canada compared to the number of ringed seal pelts purchased by the Hudson's Bay Company.

The information supplied by Fisheries and Oceans Canada to Boles et al (1980) underestimated the harvest in Rigolet by at least 57% in 1978, 27% in 1979 and in North West River by 29% in 1979. Because the Hudson's Bay Company data does not take into account the amount of ringed seal skins used for clothing, crafts and other uses (estimated at 10% in Rigolet and 38% in North West River) or those pelts sold outside of the communities, the records of Fisheries and Oceans for 1978 and 1979 are even more of an under-estimation than the above data indicates. The data recorded for the years from 1972 to 1977 must also be questioned as to accuracy.

Sealing in the Lake Melville area contributes significantly to the economic and social well-being of the people who live there. In Rigolet more ringed seals are harvested than in western Lake Melville. Because of a very limited wage economy in Rigolet many households depend on a traditional life of fishing, hunting and trapping. This way of life is a mosaic; and to interfere with one part of it may have a disproportionate effect on the whole social and economic welfare of families within the community. If the icebreaking interferes with the ability of the people of the area to pursue seals during the winter and spring months there will be an absolute reduction in the amount of seal meat available to them and they will be forced to live on expensive imported substitutes which do not contain the same nutrient profile as seal meat. Also lost will be a significant income from the sale or use of seal skins. It is not possible within the limits of this study to assess the social implications of loss of a significant portion of livelihood and traditional food supply.

TABLE 12

The Recorded Numbers[1,2] of Ringed Seals Harvested in Selected Labrador Communities During the Period 1972-1979.

	1972	1973	1974	1975	1976	1977	1978	1979
Rigolet	355	407	409	167	276	243	138	287
North West River[3]	268	*	250	188	125	159	101	243

1. The data presented are subject to error and probably understated due to factors such as inter-community trading and domestic use of pelts.

2. Adapted from Boles et al (1980).

3. Goose Bay and Mud Lake harvests are included in the numbers recorded for North West River.

* Data not available.

TABLE 13

Comparison of Fisheries and Oceans Canada Ringed Seal Harvest Data and Hudson's Bay Company Seal Pelt Purchase Data.

Community	1978		1979	
	Fisheries and Oceans[1]	Hudson's Bay Co.	Fisheries and Oceans	Hudson's Bay Co.
Rigolet	138	321	387	529
North West River[2]	*	*	243	340

1. Source: Boles et al (1980).

2. Happy Valley and Mud Lake harvests are included in the number recorded for North West River.

* Data not available.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

Aerial counts of ringed seals in Lake Melville during the spring haul-out period provided a population estimate of 2935 ± 1663 (95% C.I.). Ringed seals are broadly distributed in the lake, however relatively greater densities of ringed seals were found between Mulligan Shoals and Kinriakak Point, near Frenchman Point, and in the Green and Neveisik Island areas. The mean observed density of ringed seals in Lake Melville was 1.24/sq. km in the spring of 1982. Lake Melville in 1982 ranked below average in observed density of ringed seals compared to the Labrador coast and some eastern arctic regions in other years.

A survey of the location of ringed seal birth lairs in the Green Island area found no substantial difference in numbers or distribution of birth lairs in relation to areas where icebreaking took place in 1982 and in a nearby relatively similar, but undisturbed area. A survey of haul-out and birth lairs showed that slightly more of both occurred in the undisturbed area than in the disturbed area. The differences were not considered to be substantial or indicative. Two haul- out lairs had been built in the ship's track after the vessel had left the area in March. The icebreaker in 1982 would have been operating in the Green Island area in a period when most ringed seal pups would be expected to be nearing the end of their dependency period. Ringed seal pups found in the **M.V. Arctic** track in Lake Melville in 1981 would have been in a much earlier stage of dependency. Anecdotal reports of exposed pups and the disturbance of about to whelp females in 1981 are circumstantial evidence of possibly significant impacts of icebreaking on ringed seals.

Systematic surveys of the 1982 ship track area during the spring haul-out period did not show a statistically significant effect (at the 95% confidence level) of concentrating seals. Field observations provided a strong indication, but not proof of a significant relationship between the 1982 icebreaking events and/or resulting ice environments and ringed seal distribution patterns during the haul-out period in the area of

Green Island.

General surveys of the ship's track during the spring haul-out period showed a concentration of seals on the track. Seals began hauling-out on the west end of the track by April 12; whereas more easterly portions of the track were occupied somewhat later.

Snowmobile travel was possible over the ship's track within 40-42 hours after the icebreaker left the lake on March 24,1982. Between the time of the ship's passage and the snowmobile crossing the track, the air temperatures varied between -5°C to +8°C, and winds were variable and up to 30 knots.

Some residents of all the communities around the shores of Lake Melville hunt seals on the lake.

Of the four communities, Rigolet harvests the larger number and a greater variety of ages and species of seal, using a greater diversity of methods and during a more extended period of the year. Hunters from the western Lake Melville communities hunt chiefly in the spring and concentrate on young ringed seals killed on the ice, though there is some shooting of ringed seals in open water and some netting of harp seals in June.

Ringed seals make up the bulk of the total seal harvest in Lake Melville. According to Hudson's Bay Company purchasing records, the harvest seems to have ranged between 650 and 900 in recent years. An unknown number, probably less than 10% of the total, is kept for crafts or sold elsewhere. The other important species is the harp seal, the harvest of which has been about 200 in recent years, with one highly erratic exception in 1981. Both the harp and the ringed seal harvest are thought to be much reduced from a few decades ago, though long-term harvest records are not readily available.

The spring hunt for ringed seals takes place largely on the ice, and harvests mostly young seals after they are weaned from their mothers.

Pups are wary enough that the clubbing technique used in the harp seal whitecoat hunt would be of no use; most young seals taken in Lake Melville are shot from a distance.

Men from Rigolet tend to hunt the eastern end of the lake from camps on both the north and south shores. Hunters from western Lake Melville communities tend to hunt the upper half of the lake, with men from North West River camping in the Mulligan area. Men from Happy Valley and Mud Lake hunt mostly from camps between Gillards Bight and Etagaulet Bay. Although camping areas tend to be clustered, there are no hunting territories as such, and seal hunters range widely across the lake when they hunt.

Harvesting methods used for ringed seals include netting, shooting on the ice, shooting in open water, and spearing with a harpoon or "dart". Local conditions enable Rigolet hunters to shoot seals in open water in suitable weather anytime from about September to June - that is, before, during and after the season when Lake Melville is covered by ice. Nets are also used in this period, and three quarters of the ringed seals taken at Rigolet are taken by these two methods. Hunters in western Lake Melville take three quarters of their seals by the methods appropriate to hunting on ice, shooting and darting.

Unusually severe travel conditions hampered the 1982 spring hunt. On opening day, only 37 snowmobiles could be counted from the air. While the 1982 hunt was exceptionally poor, it illustrated the influence of environmental conditions on both hunting effort and harvest levels. When hunting costs are rising sharply and pelt values are dropping, hunting can be a gamble. However, the value of the hunt cannot be measured in terms of its marginal cash return alone. Apart from the value of the meat, which is considerable, hunting itself has a social and personal significance which is not easily measured but should not be overlooked.

Some hunters particularly in Rigolet, have a variety of concerns about the effects on icebreaker traffic on the Lake Melville seal population.

Most of these concerns are speculative and difficult to assess, particularly in the absence of baseline studies.

The interference of icebreakers with hunting and travel on the lake surface is more obvious. It will be difficult to reconcile the interests of those who must travel on the ice surface with those who must break it. While there is no easy way to measure the value of the areas which might be rendered inaccessible by an open track through the ice, it is clear that residents of Rigolet regularly hunt, trap and ice-fish around the shores of Back Bay and the shores of Lake Melville to the west. Hunters from both Rigolet and North West River cross Lake Melville in the spring to take advantage of good seal hunting and frequently better late ice conditions along the southern shore. Hunters from all communities have been accustomed to ranging widely over the ice during the spring hunt.

It is difficult to anticipate the severity of a conflict between icebreaking and traditional pursuits without knowing more about the marine traffic which might follow successful icebreaking experiments. An open ship's track down the length of an ice surface regularly used for winter travel would isolate hunters of Rigolet and North West River from a large portion of the hunting territory available to them now. A track that was less frequently used would refreeze in cold weather, becoming less of an obstacle but probably more of a hazard, because more crossings would be attempted.

Drownings when snowmobiles break through weak ice are already a leading cause of accidental death in coastal Labrador. None have resulted from icebreaking experiments, but one snowmobile has been lost and at least three hunters have fallen through bad ice on or near the icebreaker track. Any of these incidents could have easily ended in death from drowning or exposure. The number of such incidents, and therefore presumably the risk of fatalities, is likely to rise with an increase in icebreaker traffic.

People in western Lake Melville appear to be much less troubled by icebreaking impact questions than residents of Rigolet. The difference in attitude probably reflects the differing levels of dependence on traditional pursuits and different expectations of the benefits year-round shipping could bring. People in Rigolet, living at the edges of economic development in Labrador, feel they have little to gain and much to lose from experiments which might stimulate winter shipping and seriously disrupt the ice surface on which they travel and hunt.

Ringed seal meat has a high nutrient density. It makes an important contribution to the diet of households in Rigolet and western Lake Melville. From data collected using weekly wild food diaries in Rigolet from June 1980 to June 1981 it was found that 88% of the households consumed ringed seal meat. Twenty-five percent of these households consumed more than 45 kg. The replacement value to each household for this meat ranged from $525-$2147 for the group of households consuming more than 45 kg. During the same period of time, 70% of households consumed harp seal meat with 26% of these eating more than 45 kg. For this group the substitution value ranged from $525- $5320. There was an unusually large harp seal harvest in 1981.

From hunter harvest estimates the projected replacement value for ringed seal meat was $91,000 in 1980 and $94,500 in 1981 for the communities of Rigolet and North West River. The sale of ringed seal pelts contributes to the already limited income of most hunters in Rigolet and the western Lake Melville area (sales equalled $18,301 in 1979; $19,200 in 1980; $14,099 in 1981 and $5,012 in the first 8 months of 1982). The value of ringed seal pelts added to the value of meat obtained makes seal harvesting an important sector of the traditional economy of many households in the region.

4.2 RECOMMENDATIONS

The ringed seal in Lake Melville and more so the related seal hunt have a good potential for disruption if regular icebreaking were to take place. Some of the suggested negative impacts can be more fully deliniated and probably reduced by the fulfillment of the following recommendations:

1. Several annual surveys of Lake Melville should be made to determine ringed seal population levels and to locate the whelping areas. Additional information on whelping lair distribution should be collected by means of interviews with seal hunters of long experience. This information should be used in conjunction with the establishment of shipping routes so as to avoid areas generally used for whelping.

2. Qualified wildlife observers should be on board any experimental icebreaking vessels in Lake Melville and they should have the task and capability to record any observable seal-ship interactions.

3. The route of icebreakers navigating in Lake Melville, either experimental or operational, should be restricted so as to prevent excessive amount of the lake's surface being cut up, resulting in a greater disruption to hunters and a possible greater impact on seals.

4. Adequate prior notification of a general and specific nature of planned or impending icebreaking activity should be provided to all residents of Lake Melville.

5. Future studies of this nature should be available for comment by interested parties prior to their being in a finished state. This will enable critical review by the people who harvest the seals, as well as government, prior to the finishing of reports.

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APPENDIX A

Raw Data (seal counts) for April 13, 21 and May 23 Systematic Surveys of Plots in Lake Melville.

Survey Plot	April 13	April 21	May 23
1	1-1-1-2	1-1	1-5-3-2-1-1-2-1-1-2-1-2-4-2
2	No data	0	2-1-1-1-1
3	No data	0	1-1
5	No data	1-1	1-1-1-1-1-1-2-1-1-1-2-3
6	No data	0	1-1-1
7	No data	0	1-3-1
8	No data	0	2-1-23-1-1-1-1-1-1-1-3-2

NOTE: 1-1-1 etc. indicate individual or group sightings of ringed seals in each plot.

APPENDIX B

Sample of Household Survey Questionnaires conducted in Rigolet in March, 1982 and North West River May, 1982.

DATE:
HOUSEHOLD CODE:
COMMUNITY:

LAKE MELVILLE SEAL STUDY

Does anyone in this household hunt seals? YES .... NO ....
Age of hunter(s) 18-24= ..... 25-49= .... 50+ ...= .....
How often do you hunt seals? ....

JAR SEALS

1. How many jar seals did you get last year, from September 1980 to September 1981? ....

Young seals (young-of-the-year) ..... Shedders (Pullamers).....
Older jars .....

2. Roughly how many did you kill the year before? ....

Young seals ..... Pullamers ..... Older jars ......

3. How does this compare with earlier years? ....

4. How many jar seals have you killed from September 1981 until now? ....
Young seals ..... Pullamers ..... Older jars .....

5. How do you commonly take most of your jar seals? .....
By net ..... Hunting on ice ..... Hunting in water ......
Harpoon ..... (Please estimate fraction of total taken by each method)

6. Do you sell all the skins? YES ..... NO ..... If no what proportion are not

sold .... How many have been kept for crafts since last year........

7. What parts of the jar seals do you prefer to eat? ......

8. How much of the jar seal meat you hunt is eaten or given away for others to eat?
10% ..... 20% ..... 30% ..... 40% ..... 50% ..... 60% ......
70% ..... 80% ..... 90% ..... 100% ....

9. What kinds of jar seal meat do you like best?
Young ..... Older ..... Shot ..... Netted ......

APPENDIX C

Data from Household Survey Questionnaires - Rigolet

(See Appendix A for wording of questions)

	Questions		Results
A.	Does anyone in this household hunt seals?		51 hunters in 40 households
B.	Age of hunter:		
	18-24	11	
	25-49	27	
	50 plus	12	Total: 50
C.	How often hunts?		
	Whenever weather permits	28	
	Spring only	2	
	Spring and summer	2	
	Spring and fall	2	
	Spring, fall and winter	2	
	Fall	1	Total: 37
1.	Ringed seals taken from Sept. 1980-Sept. 1981		
	Young	362	
	Juvenile	73	
	Older Jars	54	Total: 489
2.	Year before:		

Young	378		
Juvenile	106		
Older Jars	30	Total:	515

3. Compare with earlier years:

More now	1
Fewer now	27
About the same	5
No opinion or answer	7

4. Ringed Seals taken from Sept. 1981 to March 1982

Young	45
Juvenile	57
Older Jars	6

5. Method:

Net (21 hunters)	129
Hunting on ice (31 hunters)	106
Hunting in water (42 hunters)	228
Harpoon	17

6. Sell all skins:

Yes	26 households, 35 hunters
No	11 households, 13 hunters

(Of 13 hunters who didn't sell all their sealskins, 9 estimated the portion they kept themselves for crafts. These ranged from 5-50%, but the majority was 10%.)

7. Preferred cuts:

No preference	10 households,	12 hunters
Liver	6 households,	7 hunters
Flippers	7 households,	12 hunters
Ribs	14 households,	17 hunters
Other (knuckles, backbone, rump, breastbone, loin, head)		9 hunters

8. Proportion eaten:

100%	29 households,	38 hunters
Less than 100%..(80,90,90)....		3 hunters

* This question, as asked, yielded very dubious data. The hunters who answered that they ate 100% of the seals they shot (i.e. nearly all of them) undoubtedly meant that they ate everything they considered edible. There is no way to know, without further study, what this actually represents.

9. Kinds of seal meat preferred:

Young	26 households,	35 hunters
Older	2 households,	2 hunters
Shot	32 households	
Netted	0 households,	0 hunters

10. Other seals:

Old Harps	286	(36 hunters)*
Whitecoats	1,660	(34 hunters)
Beaters	12	(1 man)
Rangers or Harbour Seals	48	(2 by net, rest shot, 9 men)
Other	2	grey seals

* including one man who killed an unknown number of harps.

11. Methods:

Netted	0
Shot	1,038
Clubbed	868
Method unknown	30

APPENDIX D

Data from Household Survey Questionnaire, North West River (see Appendix A for wording of questions).

Questions	Results
A. Hunt? Yes	
No	
B. Age of Hunter:	
Under 18	2
18-24	9
25-49	31
50 plus	2
C. How often Hunts? *Because of the way this question was asked the answers were not readily tabulated nor easily compared to data from Rigolet.	
1. Ringed Seals taken last year:	
Young	298
Juveniles	4
Older jars	11
2. Year before:	
Young	292
Juveniles	0
Older Jars	5
3. Compare with earlier years:	
More now	3
Fewer now	6
About the same	23

4. Ringed Seals taken from September to May, 1982:

Young	83
Juvenile	0
Older Jars	5

5. Method:

Net	14 hunters	5.2 percent
Hunting on ice	127 hunters	47 percent
Hunting in water	37 hunters	13.75 percent
Harpoon	91 hunters	33 percent

(This data includes 44 young gotten by unknown methods)

6. Sell all skins:

Yes	28
No	15
Keep for crafts	11

(These 11 keep about 38% of their skins for crafts)

7. Preferred meat:

No preference	13
Liver	7
Flippers	6
Ribs	15
Other (heart, kidney, shoulder)	9

8. Proportion eaten:

100%	35
Less than 100%	9

* This question, as asked, yielded very dubious data. The hunters who answered that they ate 100% of the seals they shot (i.e. nearly all of them) undoubtedly meant that they ate everything they considered edible. There is no way to know, without further study, what this actually represents.

9. Kinds of meat preferred:

Young	37
Older	1
Shot	33
Netted	0

10. Other Seals:

Old Harps	53 last year-28 net 25 shot
Whitecoats	0
Beaters	0
Rangers, or Harbour Seals	2- 1 shot, 1 unclear
Other	

APPENDIX E

Sample of Weekly Tally Sheets for Rigolet Spring Seal Hunt.

MONTH:
COMMUNITY:
HOUSEHOLD CODE:

JARS - RINGED SEALS
NETSIK

WEEK .... WEEK ....
HOW MANY: DATES .... DATES ....

1. Young seals
   (young of the year)

Shedders (Pullamers)

Older Jars

Comments:

2. Amount used for food

3. Where taken

4. How taken: nets

shot on ice

shot in water

Harpooned

Comments:

APPENDIX F (Part 1)

Tabulation of Data from Spring Seal Hunt, Rigolet, 1982.

	Netting			Shot in Water					
	Y	P	O	Y	P	O	B	H	R
LAKE MELVILLE AREA				5			1		
Incl. Green Island									
to Frenchman's Pt.				1					
BIG ISLAND AREA					5		1		
Incl. Peter Lucy's									
Island		1							
VALLEY BIGHT AREA									
Including:									
Pelter's Island									
Mountain Cat Pt.		3							
St. John's Island	1								
St. John's Island									
to Pelter's Is.									
NORTH SHORE AREA									
Including:									
Charley's Point									
Lowlands									
RIGOLET AREA						1			
BACK BAY	1			6		5	1		
GROSWATER BAY									
AREA				1	2	11	2	1	
Including:									
Lower Big Island				2		1	1		

Sisters		2				
Cato's Island			1			
Nat's Discovery					1	
Pompey's Island						1
DOUBLE MER		1				
Location Unclear	1			2	4	1

TOTAL NETTED: 6

TOTAL SHOT IN WATER: 61

APPENDIX F (Part 2)

Tabulation of data from Spring Seal Hunt, Rigolet, 1982.

	Shot on Ice						Harpoon		
	Y	P	O	B	H	R	Y	P	O
LAKE MELVILLE AREA	17		1						
Incl. Green Island to Frenchman's Pt.	7								
BIG ISLAND AREA									
Incl. Peter Lucy's Island									
VALLEY BIGHT AREA									
Including:									
Pelter's Island			1						
Mountain Cat Pt.									
St. John's island	2						2		
St. John's island to Pelter's Is.			2						
NORTH SHORE AREA									
Including:									
Charley's Point	16		1						
Lowlands	5						1		
RIGOLET AREA									
BACK BAY	3								
GROSWATER BAY AREA	1		1						
Including:									
Lower Big Island									

Sisters
Cato's Island
Nat's Discovery
Pompey's Island

DOUBLE MER

TOTAL SHOT ON ICE: 57
TOTAL HARPOONED: 3

APPENDIX F (Part 3)

Tabulation of data from Spring Seal Hunt, Rigolet, 1982.

	Method Unclear	Sub-total	Area Total
LAKE MELVILLE AREA		24	
Incl. Green Island to Frenchman's Pt.			32
BIG ISLAND AREA		6	
Incl. Peter Lucy's Island	14	2	8
VALLEY BIGHT AREA			
Including:			
Pelter's Island		1	
Mountain Cat Pt.		3	
St. John's Island		5	
St. John's Island to Pelter's Is.		2	11
NORTH SHORE AREA			
Including:			
Charley's Point		17	
Lowlands		6	23
RIGOLET AREA		1	1
BACK BAY		16	16
GROSWATER BAY AREA	24	21	
Including:			
Lower Big Island		4	
Sisters		2	

Cato's Island		1	
Nat's Discovery		1	
Pompey's Island		1	30
DOUBLE MER		1	1
LOCATION UNCLEAR	24		10
TOTAL		54	132

APPENDIX G

Chronological Record of Rigolet Seal Hunt, 1982, Including Species and Age Class of Seals Taken.

Reporting Period	Young Rng.Sl.	Juvenile Rng.Sl.	Mature Rng.Sl.	Juvenile Harp Sl.	Mature Harps	Harbour Sls.	Total
1-Mar22-29	0	1	0	0	0	0	1
2-Mar30-Apr 5	0	4	0	0	0	0	4
3-Apr 6-13	0	7	0	1	0	0	8
4-Apr14-21	0	0	0	0	0	0	0
5-Apr22-29	7	0	0	0	1	0	8
6-Apr30-May 7	19	1	4	1	0	1	26
7-May 8-15	15	0	4	1	0	0	20
8-May16-23	19	2	0	2	1	0	24
9-May24-31	2	0	0	0	0	0	2
10-Jun 1- 8	9	0	13	1	0	0	23
11-Jun 9-15	1	0	3	2	8	1	15
Date not Certain	0	0	0	0	1	0	1
TOTAL	72	15	24	8	11	2	132

APPENDIX H

Household Harvest Records, Rigolet Spring Seal Hunt, 1982.

Household Number	Young Rng.Sl.	Juvenile Rng.Sl.	Mature Rng.Sl.	Juvenile Harps	Mature Harps	Harbour Sls.	Total
2	5			1			6
3							
4		2	2				4
5							
7	1		1				2
10	2		1	3	1		7
12							
13	2		1		2		5
16							
18		2	1				3
23							
24	3						3
25							
26			2				2
27	1						1
28	2						2
29	4						4
30	5	1	3				9
31		3	2		3	1	9
33		3		3	2	1	9
34	15		2				17
35							
36	15	3	7		3		28
37			1				1
38							
41							
42							

44	1						1
45							
46							
47							
48							
51	1						1
52	2	1	1				4
53							
54				1			1
55							
56	3						3
57							
58	7						7
59	3						3
60							
TOTALS	72	15	24	8	11	2	132

24 Families

APPENDIX I

Sale of Seal Skins - North West River, Labrador[1]
Sept. 1981 - Aug. 1982

Month	Ringed		Harps		Harbour	
	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Sep.81 NIL						
Oct.81 NIL						
Nov.81 NIL						
Dec.81	2	30.00				
Jan.82	3	75.00				
Feb.82	4	48.00				
Mar.82			2	60.00		
Apr.82 NIL						
May 82	65	833.00	9	120.00[2]		
Jun.82	29	343.00	13	491.00	1	20.00
Jul.82	68	751.00	4	155.00		
Aug.82 NIL						
Totals	171	2080.00	28	826.00	1	20.00

1. From the records of the Hudson's Bay Company.
2. Skins spoiled - wrapped in plastic.

Sale of Seal Skins - North West River, Labrador[1]

Sept. 1978 - Aug. 1979

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Oct.78	6	98.00			3	52.50
Nov.78	NIL					
Dec.78	20	377.00			1	35.00
Jan.79	2	51.00				
Feb.79	NIL					
Mar.79	NIL					
Apr.79	1	22.00				
May 79	228	5280.00				
Jun.79	73	1999.00	6	315.00		
Jul.79	32	637.00				
Aug.79	2	43.50				
Totals	364	8507.50	6	315.00	4	87.50

1. Source Hudson's Bay Company Store.

Sale of Seal Skins - North West River, Labrador[1]
Sept. 1979 - Aug. 1980

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No. of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Sep.79	2	44.00			1	22.00
Oct.79 NIL						
Nov.79 NIL						
Dec.79			2	100.00	10	290.00
Jan.80 NIL						
Feb.80			2	120.00		
Mar.80	3	45.00				
Apr.80 NIL						
May 80	148	3237.00				
Jun.80	204	4523.00	69	3595.00		
Jul.80	33	815.00	19	1754.00	1	17.00
Aug.80	11	220.00	3	174.00		
Totals	401	8884.00	95	5743.00	12	329.00

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[1] From the records of the Hudson's Bay Company.

Sale of Seal Skins - North West River, Labrador[1]
Sept. 1980 - Aug. 1981

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Sep.80 NIL						
Oct.80 NIL						
Nov.80 NIL						
Dec.80 NIL						
Jan.81 NIL						
Feb.81			1	40.00		
Mar.81 NIL						
Apr.81	1	20.00	10	305.50		
May 81	228	4309.00	19	485.00		
Jun.81	52	989.00	11	497.00		
Jul.81	21	357.00	2	65.00		
Aug.81	5	73.00				
Totals	307	5748.00	43	1392.50		

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[1] From the records of the Hudson's Bay Company.

Sale of Seal Skins - Rigolet, Labrador[1]
June 1977 - December 1977

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Jun.77	32	696.00	21	280.50		
Jul.77	37	748.50	3	39.00	6	105.00
Aug.77	12	164.00				
Sep.77	7	79.00	2	30.00		
Oct.77	3	23.50	1	15.00	3	45.00
Nov.77	20	162.00			3	48.00
Dec.77 NIL						
Totals	111	1873.00	27	364.50	12	198.00

[1] Source Hudson's Bay Company Store.

Please note that in 1977 there were two grey seals: 1 in July at $12.00 and 1 in October at $4.00.

Sale of Seal Skins - Rigolet, Labrador[1]
January 1978 - December 1978

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Jan.78	11	74.00				
Feb.78	1	8.00				
Mar.78	6	57.00	1	7.00		
Apr.78	10	108.00	13	347.50	4	110.00
May.78	33	573.00	3	75.00		
Jun.78	71	1132.00	39	1177.50		
Jul.78	100	1534.00	46	1362.50	4	75.00
Aug.78	28	481.00	9	255.00	11	230.00
Sep.78	29	504.00	2	50.00	8	175.00
Oct.78	17	301.00	2	35.00		
Nov.78	14	258.00	3	60.00		
Dec.78	1	18.00				
Totals	321	5048.00	113	3274.50	32	685.00

1. Source Hudson's Bay Company Store.

Please note that there were 3 grey seals: 1 in July at $4.00, 1 in August at $15.00 and 1 in September at $20.00.

Sale of Seal Skins - Rigolet, Labrador[1]

January 1979 - December 1979

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Jan.79	9	111.00	2	47.50	1	20.00
Feb.79	50	756.00	4	82.50		
Mar.79	21	346.00				
Apr.79	50	819.00	5	185.00		
May 79	88	1491.00	6	220.00	1	25.00
Jun.79	75	1444.50	23	655.00	3	45.00
Jul.79	80	1554.50	30	897.50	10	190.00
Aug.79	7	165.00	6	230.00	6	130.00
Sep.79	95	1911.50	32	977.50	26	577.00
Oct.79	14	326.00			4	80.00
Nov.79	30	1120.00			6	110.00
Dec.79	10	180.00	1	25.00		
Totals	529	10224.50	109	3320.00	57	1577.00

[1] Source Hudson's Bay Company Store.

Please note that there were 8 grey seals: 1 in February at $20.00, 2 in July at $35.00, 2 in August at $35.00 and 3 in September at $50.00.

Sale of Seal Skins - Rigolet, Labrador[1]
January 1980 - December 1980

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Jan.80	7	193.00	16	430.00	2	35.00
Feb.80	14	276.00	4	139.00		
Mar.80	46	936.00	5	240.00		
Apr.80	46	950.00	5	250.00		
May (0	49	1245.00	35	1830.00		
Jun.80	141	3471.00	59	3195.00		
Jul.80	67	1497.00	7	270.00		
Aug.80	7	154.00	1	25.00		
Sep.80	20	499.00	3	119.00	7	195.00
Oct.80	26	730.00	1	15.00	6	160.00
Nov.80	11	305.00			8	210.00
Dec.80	4	110.00				
Totals	438	10366.00	136	6513.00	23	600.00

[1] Source Hudson's Bay Company Store.

Please note that there were 4 grey seals: 2 in August at $55.00 and 2 in September at $45.00.

Sale of Seal Skins - Rigolet, Labrador[1]
January 1981 - December 1981

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $
Jan.81	14	315.00	4	190.00	2	40.00
Feb.81	76	1946.00	7	370.40	1	20.00
Mar.81	18	409.00	3	155.00		
Apr.81	32	677.00	723	24500.00		
May 81	114	2936.00	166	5281.00		
Jun.81 NIL						
Jul.81	47	1144.00	55	1943.00	4	64.00
Aug.81	24	504.00	12	512.00	16	388.00
Sep.81 NIL						
Oct.81	17	275.50	1	25.00	7	152.00
Nov.81	9	114.00			1	20.00
Dec.81 NIL						
Totals	351	8320.50	971	32976.00	31	684.00

1. Source Hudson's Bay Company Store.

Please note that there are 11 grey seals: 4 in August at $96.00, 7 in October at $128.00 also 1 Hood in July at $20.00.

Sale of Seal Skins - Rigolet, Labrador[1]

January 1982 - September 1982

	Ringed		Harps		Harbour	
Month	No.of Seals	Total Price Pd. $	No.of Seals	Total Price Pd. $	No of Seals	Total Price Pd. $
Jan.82	10	119.00	22	564.00	1	15.00
Feb.82	12	165.00	14	319.00		
Mar.82	33	444.00	7	189.00	1	20.00
Apr.82 NIL						
May.82	55	694.00	7	129.00		
Jun.82 NIL						
Jul.82	107	1396.00	35	620.00	2	40.00
Aug.82	11	144.00	8	141.00		
Sep.82	8	102.00	1	18.00	1	20.00
Totals	236	3064.00	94	1980.00	5	95.00

1. Source Hudson's Bay Company Store.

Please note that there was one grey seal in September at $18.00.

POOR

QUALITY

ORIGINAL